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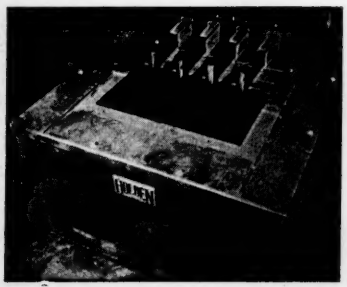
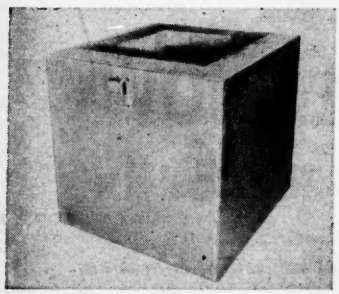
the news digest magazine

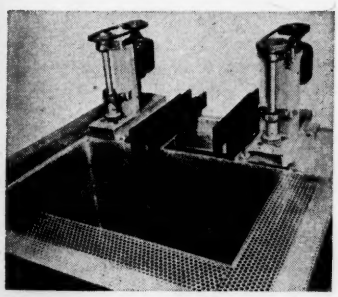
Volume XXVI - No. 5 May, 1953



Type 202 Electrode Furnace, Temperature range 300-1750° F.



Prefabricated ceramic pot assembly, for use in over-the-side electrode furnaces with neutral baths.



Type 401 Marquenching Austempering Furnace.

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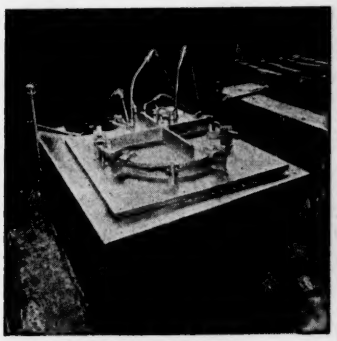
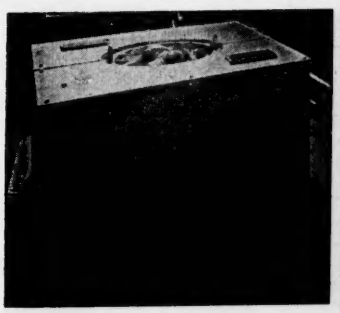
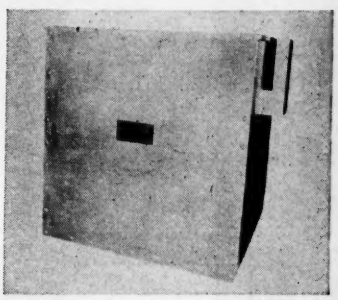
Desanding
Bright tempering
Liquid Carburizing
Aluminum heat treating
High Speed steel hardening
Cleaning of rubber molds



Liquid Nitriding Furnace.



Gas Fired Type 212, Temperature range 300-1700° F.



Furnace assembly of martempering-austempering unit, gas fired for small production application.

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AMERICAN SOCIETY FOR METALS
7301 Euclid Avenue Cleveland 3, Ohio

OCTOBER 19–23 1953

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXVI, No. 5 May, 1953

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CONTENTS

Western Metal Show Breaks All Records 4
New Jersey Panel on Control Processes 5
A. S. M. Visiting Lectureship Program 8
A. S. M. Sponsored Teachers' Course in Metallurgy 11
From the *Metal Showman* 14
Iowa Regional Meeting 16
Philadelphia Inaugurates Junior Section 17

IMPORTANT LECTURES

Rotary Drilling Tools, by J. R. Whanger 6
Surface Properties of Metal Crystals, by A. T. Gwathmey 7
Vanadium in the Steel Industry, by T. W. Merrill 14
Electric Furnace Steel Production, by H. F. Walther 19
Challenge in Aircraft Designing, by H. R. Foottit 22

DEPARTMENTS

New Films ..... 13 Meeting Calendar 21
Employment Service Bureau 44

ASM REVIEW OF METAL LITERATURE

A — GENERAL METALLURGICAL 23
B — RAW MATERIALS AND ORE PREPARATION 24
C — NONFERROUS EXTRACTION AND REFINING 24
D — FERROUS REDUCTION AND REFINING 25
E — FOUNDRY 26
F — PRIMARY MECHANICAL WORKING 27
G — SECONDARY MECHANICAL WORKING 28
H — POWDER METALLURGY 28
J — HEAT TREATMENT 29
K — JOINING 30
L — CLEANING, COATING AND FINISHING 31
M — METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES 32
N — TRANSFORMATIONS AND RESULTING STRUCTURES 34
P — PHYSICAL PROPERTIES AND TEST METHODS 36
Q — MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATIONS 37
R — CORROSION 41
S — INSPECTION AND CONTROL 41
T — APPLICATION OF METALS IN EQUIPMENT AND INDUSTRY 42
V — MATERIALS 43

Western Metal Show Sets New All-Time Record

An all-time record has been set for attendance, registration and sales-from-the-floor by the Western Metal Congress and Exposition, held March 23 to 27 in Pan-Pacific Auditorium and Hotel Statler, Los Angeles. Clocked attendance for the 5-day show totaled 53,453 and registration added up to 33,648.

Large audiences heard the technical sessions, which were the best attended of all Western Metal Congresses.

Among the 100 or more timely and important papers presented, those drawing the most enthusiastic attendance were the A.S.M. Symposium on "Zirconium" and the S.A.E. Seminar on "Ultra-High-Strength Alloy Steels." The latter is reported in the May issue of *Metal Progress*, which also contains a number of the zirconium papers.

Success of the show and technical sessions assures repeat holdings of the combined events in Los Angeles on a 2-year basis. A lease has been signed by A.S.M. for the Pan-Pacific Auditorium for March 21 to 25, 1955, with other dates reserved for 1957, 1959 and 1961.

The Exposition, with 385 exhibitors, equaled in size the National Metal Expositions, held annually in the great eastern industrial centers, of only a few years ago. The previous high for a western show was 191 exhibitors in Los Angeles in 1949, and the average over many years has been about 150.

Accomplishments of the show have prompted many exhibitors to file applications with A.S.M. to insure that space be held for them in Los Angeles in 1955. Many exhibitors, during the five days, sold every item in their booths and took orders for several more.

Attendance naturally was heavier from the Los Angeles, San Francisco, Oakland and San Diego regions than other western areas, but many metal engineers and plant heads were present from all other parts of the west, with a liberal representation of easterners intent on seeing and hearing the latest developments.

The large turnout is representative of the great recent industrial expansion in the west. New developments in metals and their fabrication find immediate application in the western area.

Candid Shots Taken at the Western Metal Show Recently Held in Los Angeles Give Photographic Evidence of the Show's Popularity

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Control Processes Discussed by Jersey Panel

New Jersey's Panel on "Metallurgical and Heat Treatment Control" Included: M. R. Murless, Monroe Calculating Machine Co.; V. E. Bender, Eclipse-Pioneer Div.; G. Davenport, Gould & Eberhardt, Inc.; W. C. Harding, Westinghouse Electric Corp., and R. Bloss, B-M Heat Treating Co. W. H. White was moderator

Reported by John L. Everhart
Materials & Methods

"Practical Metallurgical and Heat Treatment Control" was the subject of a panel discussion moderated by W. Hughes White held by the New Jersey Chapter. Panel members included M. R. Murless, chief metallurgist, Monroe Calculating Machine Co., Vincent E. Bender, metallurgist, Eclipse - Pioneer Division, Granger Davenport, chief engineer, Gould & Eberhardt, Inc., William C. Harding, materials engineer, Westinghouse Electric Corp., and Robert Bloss, superintendent, B-M Heat Treating Co.

Mr. White opened the meeting by noting that the group represented a cross section of large and small industry. He pointed out that Mr. Murless represented a company which was mass producing small parts; Mr. Davenport, a small company producing medium heavy machine tools in small lots; Mr. Bender, a large instrument and aircraft plant; Mr. Harding, a large company handling thousands of different parts; and Mr. Bloss, a commercial heat treating organization.

Each panel member read a prepared paper dealing specifically with his own organization. Each had his own approach but all agreed on the necessity of following the material from its selection in the engineering department to the finished part. Highlights of the papers follow:

A typical plant, set up to handle small parts in bulk, heat treats from 1200 to 1500 lb. of steel per day, the parts ranging in size from those averaging 6500 per lb., to those running 5 per lb. Rigid standards are set since these parts must function satisfactorily in high-speed machines. Specifications based on A.S.T.M., S.A.E., and similar standards are used in purchasing and every lot of raw material is inspected. Company standards are used to control heat treating procedures. Inspection is conducted in the heat treating department with critical parts receiving 100% inspection while others are spot checked.

An entirely different procedure is used in a small plant producing machine tools. Such a plant may be too small to require its own control laboratory and selection of materials becomes the responsibility of the engineering department. In such a plant, standardization on the minimum number of raw materials required to make the product is necessary. Detailed engineering data sheets giving all necessary information are developed. They give a choice of alternate materials. In practice, only the symbol indicating the type of material is carried on the drawing and all operations, such as heat treating, are controlled by the master data sheets. Thoroughness of inspection depends on the application of the part. Rejections are based on the decisions of a group of inspectors, or in the case of expensive parts, on a committee of department heads.

Parts used in aircraft applications are usually planned for maximum performance at minimum weight and thus are designed with relatively low factors of safety. In a plant producing parts such as these, the best available materials must be used, excellent processing procedures are required and rigid inspection is necessary. A typical plant may have 200 material specifications covering the requirements in detail. Incoming materials are tested and approved. After acceptance, detailed process specifications are followed rigidly. Such a system works well in a large organization where numerous people are involved.

In an organization handling thousands of parts, specifications are developed by a central standards group and may cover as many as 9000 materials. Each individual plant is supplied with a standards book covering materials to be used by that organization and the processes to be followed. Incoming materials are checked, accepted and stocked. Material is withdrawn from stock as required, processed according to specification and inspected to determine conformation with the standards.

In a typical commercial heat treating shop, parts received for treatment are sketched as a means of identification in the shop. Information on the type of steel and the hardness desired is placed on a card and it should be noted that complete information is necessary if spoilage is to be kept to a minimum. Both card and sketch accompany the part into the shop. The tool foreman specifies the heat treatment required and this treatment is followed rigidly. After treatment the part is inspected and the hardness is checked.

Following the formal presentations, the meeting was opened to questions from the floor, and lively discussion followed.

MIT Offers Summer Course In Physical Metallurgy

Massachusetts Institute of Technology is holding a special summer session, from June 16 to 26, inclusive, on the "Fundamentals of Physical Metallurgy". This special course will focus on equilibrium and kinetics, diffusion, nucleation and growth, solidification, precipitation and shear transformations, grain boundary phenomena, plastic deformation, stresses in metals, and recrystallization and grain growth. The general level of the lectures will be adjusted to the metallurgist who has not had advanced graduate work or who has been out of school several years. The program will be primarily educational in nature, and will not serve as a research conference.

The program will be under the direction of Morris Cohen, M. B. Bever, and B. L. Averbach, of the department of metallurgy. Other members of the M.I.T. staff will participate, in addition to invited lecturers from other universities and laboratories. No academic credit will be offered.

Further information about this course can be obtained by writing to: Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Hear Rotary Drilling Tool Discussion

Present at the Joint Meeting of the Missouri School of Mines Chapter A.S.M. and the St. Louis Chapter of the American Foundrymen's Society in February Are, From Left, Front Row: William Baxter, American Brake Shoe Co.; M. Hughen, Missouri School of Mines; J. R. Whanger, Speaker, Hughes Tool Co.; J. Wheeler, Missouri School of Mines; and J. Williamson, M. A. Bell Co., and Back Row: O. W. Burg, Hughes Tool Co.; D. S. Eppelsheimer, Missouri School of Mines; F. H. Berleth, Hughes Tool Co., and A. W. Schlechten

Reported by Jack Humphrey
Missouri School of Mines

The Missouri School of Mines Chapter held a joint meeting with the local American Foundrymen's Society chapter in the new metallurgy building of the school recently.

The speaker of the evening, J. R. Whanger, a graduate of M.S.M. now working for Hughes Tool Co., spoke on the "Metallurgical Aspects of Oil Well Rotary Drilling Tools". His talk was supplemented by slides and a short movie which served as excellent illustrations for the talk. Mr. Whanger explained the operation of his company's drilling tools before going into the metallurgical phases of material and process control.

The main requirements of the drills are to withstand terrifically high compression loads on the rotary bits and tool joints, and the drill stem must withstand high combined tension and bending stresses.

The rock bit cutters are case carburized with a controlled surface carbon, and then the double quench and temper method or hardening is employed. The teeth of the rock bit cutters are hard face by the use of tungsten carbide.

The adoption of the flash welding process by Hughes Tool Co. to join tool joints to drill pipe has resulted in strong, dependable structures.

The Hughes Laboratory in Houston is working now to develop new and improved tools to meet the ever-increasing demands of the oil well drilling industry.

Induction Hardening Process Topic of Talk in Springfield

Reported by Howard E. Boyer
Chief Metallurgist
American Bosch Corp.

"Metallurgical Aspects of Induction Hardening" was the subject of the technical presentation at the January meeting of the Springfield Chapter by Joseph F. Libsch, associate professor at Lehigh University and metallurgical consultant for Lepel High Frequency Laboratories.

Mr. Libsch first reviewed the historical background of induction heating. He emphasized that it was not new; patents had been granted between 1850 and 1900, although primarily, induction methods were used as a means of melting metals. Newer developments, initiated by E. F. Northrup, extended induction methods to the heat treatment of metals.

Mr. Libsch pointed out how the frequency range varies widely depending on the method used for supplying the alternating current. When the source is a motor generator the frequency is often as low as 2000 cycles per sec., while frequency ranges of 400,000 to 500,000 cycles per sec. are more common with the tube type of generators. The specific application and depth of heat penetration desired usually dictates the optimum frequency range.

Mr. Libsch emphasized the fact that, while many different steels lend themselves to hardening by induction methods, plain carbon steels of the medium carbon range, such as C-1045 and C-1050, are usually preferred, due to the fact that the simple carbides dissolve in the austenite much faster than complex carbides, thus rendering a more complete carbide solution in the rapid heating cycles afforded by induction.

Mr. Libsch illustrated by graphs that alloy steels could be satisfactorily heated for hardening by induction methods using temperatures from 100 to 300° F. higher than normal. Even though excessive temperatures are reached a minimum of grain growth takes place because of zero time at temperature.

Tempering by means of induction, termed "flash tempering", was also discussed. Mr. Libsch showed that steels could be tempered at somewhat abnormal temperatures for only a few seconds, which duplicate results obtained by furnace tempering for 1 hr. at lower temperatures.

Trends in Business Future Predicted

Reported by Lacy M. Smith
Eastman Kodak Co.

The Rochester Chapter held its 15th Annual Joint Meeting with the Rochester Industrial Management Council's Supervisors and Managers group recently. The speaker, Tom Campbell, editor of *Iron Age*, discussed "What Happens to Business When Defense Spending Levels Off".

According to Mr. Campbell, defense spending will change little in the foreseeable future. While there may be some cuts, it is more a question of getting more for the defense dollar. In the steel industry, from 12 to 14% of the output has gone to direct military and atomic energy requirements. This, he believed, should be considered as part of the price we should pay for living under conditions where we continually face threats from the communistic world.

Mr. Campbell predicted that there would be no substantial leveling off of business in 1953. Confidence in the current administration in Washington was listed as an intangible but important new ingredient in improving the business atmosphere. Inventories of most goods are now relatively low. In the steel industry, where inventories are not low, they are unbalanced. With a goal of about 100 million tons to be produced in 1953, no marked drop in steel production is expected. Mr. Campbell pointed out that the last quarter of this year might see steel manufacturers retiring some of their less profitable installations.

Without taking into consideration the extreme unpredictability of the buying public, Mr. Campbell felt that there will be a continued upswing in the appliance and automobile fields. This will stem, in part, from the coming of age of the large crop of post-depression babies whose buying habits tend toward labor-saving appliances for more comfortable living.

This optimism was not without a word of warning. American industry faces a period of tough competition and high labor costs. These challenges can be met only by dependence on new labor-saving equipment, improved labor relations, and greater emphasis on sales. With these challenges met, the economy should remain prosperous for the next several years, with the consumer getting more for his money.

Defines Surface Properties of Metal Crystals

Reported by Walter Showak
Penn State College

Allan T. Gwathmey, associate professor of chemistry, University of Virginia, spoke on the "Surface Properties of Large Metal Crystals" at a meeting of the Penn State Chapter.

Dr. Gwathmey's research work has been in the field of surface chemistry of metals. While he was working in industry he was impressed with the small number of satisfactory methods for studying the basic mechanisms of catalytic reactions. After many years of research, a special method of studying surface reactions was developed using large spherical single crystals on which the different faces could be identified and studied. Numerous surface processes including oxidation, catalysis, electroplating, wetting, friction, and wear were studied in varying degrees on crystals of a dozen metals. These studies revealed that the properties of a metal surface depend greatly on the crystal faces exposed at the surface.

The spherical single crystals are cut from cylindrical rod single crystals. As a result of this method of preparation, the surface of the specimen must be treated to remove the strained material. Electrolytic polishing is used to accomplish the above and a smooth surface also results. Next, the specimen is heated in hydrogen atmosphere to anneal it and remove the oxide film, and then it is ready for experimental studies.

It was pointed out that oxidation is one of the most important reactions that occurs and we must have an understanding of it before we can explain such other processes as friction, wear, and electroplating. In order to understand the observed rates of oxidation, one must know the structure of the oxide in relation to the underlying metal structure. The importance of the orientation of the oxide to the underlying metal is shown in the case of copper by the fact that if the misfit is of the order of 18%, thin films of the oxide tend to be monocrystalline with a specific orientation on each crystal face. Single crystalline thin oxide films with misfits greater than 18% are not observed. If the oxide film is below a certain thickness, 500 to 800 Å, it is highly oriented, while above this range it rapidly becomes polycrystalline as the thickness increases. The thickness of oxide films, and hence rates of oxidation, were determined qualitatively by interference colors and quantitatively by elliptically polarized light.

When catalytic reactions, such as the reaction of hydrogen and oxygen, are allowed to take place on single crystal spheres of copper, definite facets form on certain planes due to the movement of atoms. The rates of catalysis were shown to vary with the crystal face exposed at the surface. It was also shown that the deposition of carbon, caused by the catalytic decomposition of carbon on a nickel crystal, takes place at least a 1000 times more rapidly on one face than on another.

Electrolytic potentials between various crystal faces have been measured. Measurement of these potentials when there are oxide coatings or other coatings on the surface are presently being investigated.

It was pointed out that the stress required to pull apart two copper crystals, which were placed together in such a way that the same crystallographic planes were in contact, was the same as the fracture stress of copper. It appears that this data is of importance in regard to the theories of fracture.

Opens New Warehouse

To meet the growing demand for brass and copper products created by industrial expansion in the Louisville area, the Bridgeport Brass Co. will open a new warehouse in Louisville, Ky., in May. The Louisville district sales office will be in the same building.

Reviews Constructional Alloy Steels

John Mitchell, Assistant to the Manager, Alloy Sales, United States Steel Corp., Spoke on "Historical Aspects of and Conservation in Constructural Alloy Steels" at a Meeting of the Saginaw Valley Chapter. Shown above are, from left: A. A. Moore, secretary-treasurer; Mr. Mitchell; F. L. Mackin, chairman; and R. S. Haverberg, vice chairman

Reported by William C. Cole
AC Spark Plug Division

A discussion of the "Historical Aspects of and Conservation in Constructional Alloy Steels, 1900 to 1952" was presented to the Saginaw Valley Chapter by John Mitchell, assistant to the manager, alloy sales, U. S. Steel Corp., Mr. Mitchell traced 52 years of the history of constructional alloy steels, showing the trends of the levels of the elements used during this period.

Nickel is and will continue to be the most critical of the alloy elements. Therefore, it was assumed by the speaker that any increase in production of constructional alloy steel would have to be accomplished without using more nickel than is used at the present time. In dealing with such an approach, careful consideration must be given to the impact of shifting the load from nickel to molybdenum, chromium, manganese, vanadium, silicon or boron.

During the past 52 years the production of constructional alloy steels over an extended normal production period approximates about 5 to 6% of total ingot production. This relationship holds true not only in the United States but all over the world. During World War II the percentage of constructional alloy steel ingots rose to 11.2% of the total.

Nickel in nickel-bearing scrap in 1940 averaged 1.75%; by 1943 scrap yielded 63% of the nickel necessary to meet the demands of constructional alloy steel production. At the present time the average nickel content of constructional alloy steels is below 1% and only 43% of the total nickel needed is recovered from scrap. This indicates that with increasing production and decreasing alloy content, current high recoveries from scrap cannot continue. As alloy content continues to drop, the law of diminishing returns will be accelerated. Elements in scrap will be lost because there is no commercial incentive in their separaton.

It is therefore necessary that constructional alloy steel manufacturers and consumers cooperate in the development and use of grades which are most satisfactory and reach the necessary further conservation without harmful effects.

A.S.M. Visiting Lectureship Makes Important Contributions to Education

The A.S.M.'s Visiting Lectureship Program, which was established in 1952 as a service to higher education in science and engineering, gives a practical answer to a long-standing problem faced by educational instituitions with established budgets for securing outstanding specialists as lecturers.

Eight leading universities with metallurgical engineering schools are participating in the Visiting Lectureship Program during the present school term. The Society arranges the details of the lecturer's visit, after he has been chosen by the applying university, defrays the expenses incurred as a result of his trip, and provides an honorarium for the speaker.

The universities which have applied for a Visiting Lectureship under the A.S.M. assistance program are:

Missouri School of Mines, Rolla, Mo., with Reginald S. Dean, consulting metallurgist, Washington, D. C., as visiting lecturer. Lectures were given Mar. 10, 11, 12 and 13.

Princeton University, Princeton, N. J., with Cryil Stanley Smith, director, Institute for the Study of Metals, University of Chicago, as lecturer. His lectures were presented Apr. 30 and May 1.

Johns Hopkins University, Baltimore, Md., with Bruce Chalmers, professor of metallurgy, University of Toronto, Canada, as lecturer. Dr. Chalmers visited Johns Hopkins on Apr. 6 and 7.

Illinois Institute of Technology, Chicago. Dr. Chalmers was the visiting lecturer on Apr. 13 and 14.

University of Wisconsin, Madison, Wis., with L. S. Darken, U. S. Steel Research Laboratories, lecturer. Mr. Darken spoke on Apr. 29 and 30.

Carnegie Institute of Technology, Pittsburgh. Dr. Bruce Chalmers spoke in Pittsburgh on Apr. 20 and 21.

Colorado School of Mines, Golden, Colo., heard Charles Barrett, professor of metallurgy, Institute for the Study of Metals, University of Chicago, speak on Apr. 29, 30, and May 1.

University of Cincinnati, Cincinnati, Ohio. W. M. Baldwin, research professor, Case Institute of Technology, Cleveland, spoke on Apr. 29.

In a letter from A. W. Schlecten, chairman, department of metallurgical engineering, Missouri School of Mines and Metallurgy, the visit of Reginald S. Dean was an outstanding event for the university, with results that will be long felt among the students and faculty members who attended the lectures. Prof. Schlecten stated that the visit of Dr. Dean established an entire new approach to higher education in science and engineering. "We believe", he said, "that the A.S.M. lectures were most worthwhile, and we took pains to point out, both in our written publicity and in our introductions, that the talks were made possible by the action of the American Society for Metals. We believe the program is worth continuing, and we hope that the Missouri School of Mines and Metallurgy will be considered as a participant in the organization in future years".

Many letters of commendation have been received from engineering deans and college presidents, all of them in thorough accord with the principles and the purposes of the Lectureship Program.

Carbonitriding Process Described at Hartford

Reported by Harold M. Brodsky

Assistant Chief Metallurgist
The Fafnir Bearing Co.

At a recent meeting of the Hartford Chapter A.S.M., M. B. Bever of Massachusetts Institute of Technology spoke on "Carbonitriding".

The speaker stressed the fact that carbonitriding as commonly carried out is a modification of carburizing rather than of nitriding. After reviewing the fundamentals of carburizing, he outlined the distinctive properties of carbonitriding, which are primarily due to the presence of nitrogen in the case.

Nitrogen as an alloy element lowers the transformation temperature and increases the hardenability. It also tends to promote the retention of austenite. These effects are noticed in a majority of the applications of carbonitriding. A few installations, however, which use temperatures of 1450° F. or less, rely mainly on the formation of a compound layer for wear resistance and moderate hardness.

The speaker discussed in detail the structures and properties of typical cases carbonitrided in the range of 1500 to 1650° F. He presented experimental data on hardness and resistance to tempering, and discussed briefly case-hardened materials with respect to wear, fatigue, and corrosion.

Dr. Bever reviewed the conditions of temperature, time, and gas composition currently being used in industrial carbonitriding practice. This information was based on a survey conducted with the cooperation of over two dozen plants. Examples of applications concluded the talk.

Cites Value of Electron Microscope in Research

Reported by William C. Cole

AC Spark Plug Division

A lecture on "Practical Applications of the Electron Microscope in Metallurgy" was presented by R. D. Heidenreich at a recent meeting of the Saginaw Valley Chapter. Mr. Heidenreich, of Bell Telephone Laboratories, Inc., and president of the Electron Microscope Society of America, discussed the application of the electron microscope and electron diffraction to the structures in metals and alloys.

Information concerning surface cleanliness, precipitated phases and crystal perfection obtained from electron diffraction patterns, plus the subsequent electron microscopic examination, form a very effective research tool. The preparation of the sample is of utmost importance. Extreme care must be taken not to contaminate or distort the surface of the specimen.

The particle size of the phases being observed is the most limiting factor of this research tool. Even the electron microscope fails to resolve the very finely divided precipitate phases in their normal effective state. Therefore, the specimen must be artificially produced by coalescent heat treatment.

Thermonic emission microscopy offers a very realistic approach to the study of transition structures in that it allows the observance of the transitions as they take place.

Gives Lead-Tin Alloys And Soldering Lecture

Reported by Eldon E. Van Meter

Sales Engineer, Turco Products

The Wichita Chapter heard a talk on "Lead-Tin Alloys, Solders and Soldering" by Hugo Becker, manager of materials manufacturing, Continental Can Co., at the March meeting.

Mr. Becker explained very thoroughly the dipping of steels in tinning and covered the various soldering techniques and formulas. Mr. Becker helped persons in the audience clear up problems relating to production applications of tinning and soldering in a question period following his talk.

Steels for Service At High Temperatures Described by Speaker

Reported by C. O. Penney

Denver & Rio Grande Western R. R. Co.

Peter Payson, assistant director of research for the Crucible Steel Co. of America, spoke before the Rocky Mountain Chapter on "Steels for High-Temperature Service".

During the course of the talk Mr. Payson emphasized that design for room-temperature service was based on a relatively fixed value of yield strength, whereas designs for high temperature service were based on continuous deformation at a specific slow rate.

Studies of creep vs. time at temperature reveal three stages of deformation, namely, the primary stage which reveals a rapid decrease in creep rate, followed by the secondary stage which presents a relatively constant creep rate over a comparatively long period of time, and finally the tertiary stage which reveals a rapid increase in creep rate, resulting in stress rupture.

Mr. Payson presented slides showing the chemical compositions of various materials suitable for high-temperature service, including low alloy constructional steels, ferritic and austenitic stainless steels, nickel-chromium cast steels, and nickel-base and cobalt-base materials. Comparisons were also made of the creep rate of various materials including titanium, 18-8 stainless steel, and the important superalloys. Of particular interest was a graph plotting stress against parameter values with corresponding service life expected at various temperatures for a wide range of alloys.

Mr. Payson concluded that the field of metallic materials for high-temperature service has now been exploited to a high degree and that metallurgists are leaning more and more toward the assistance of the ceramics engineer for a solution to the problem of materials for service at high stress levels at ever higher temperatures, from 2000° F. and up. Pure molybdenum appears promising for such high-temperature service, if it can be protected against oxidation by cladding or ceramic coatings.

Cleaning Aluminum For Spot Welding

Reported by R. E. Layton

Quality Control Manager
O. A. Sutton Corp.

The Wichita Chapter was addressed by Clarence Bremer of the research department of Oakite Products, Inc., recently. Because of the amount of aircraft production in the Wichita area, Dr. Bremer's subject, "Cleaning of Aluminum for Spot Welding", proved to be a popular one.

Dr. Bremer stated that in the cleaning of aluminum, many factors determine the success of the operation. The previous history of the metal is important: care in keeping the metal free of corrosive atmospheres, fingerprints, water and heat treat stains, reactive lubricants, and occluded dirt all play a part in subsequent treating of the metal. Inhibited cleaners may actually accelerate attack on previously corroded portions although a predip in acid may minimize the effect. Certain heat treatments may cause welding difficulties. Air heated stock, particularly in lighter gages, is harder to process than salt bath stock.

The usual procedure for cleaning aluminum for spot welding consists of removing oil and identification inks in an alkaline cleaner to obtain a chemically clean surface, followed by deoxidizing in an acid, together with rinses after each step. The process may be carried out automatically or by manual operation. In cleaning and rinsing, aluminum is not in an active state and the time factor is, therefore, not of a critical nature.

Speaks on Processing Nonferrous Metals

Sidney Siegal (Right), Assistant Superintendent, General Plate Co., Spoke on "Annealing of Nonferrous Metals in Protective Atmospheres" During the First of a Series of Educational Lectures on "Modern Processing of Nonferrous Metals" Given by the Rhode Island Chapter. With Mr. Siegal is Arthur S. Johnson, Achorn Steel Co., Chapter Chairman

Reported by Warren M. Hagist

Ass't. Professor of Metallurgical Eng.
University of Rhode Island

"Modern Processing of Nonferrous Metals" was the subject of the Rhode Island Chapter's annual educational series. Outstanding men in the field presented a series of nontechnical lectures designed to give the practical man up-to-date information on the working and joining of nonferrous metals, as well as substitutions for the currently restricted metals.

In the first lecture of the series, Sidney Siegel, assistant superintendent, General Plate Co., Attleboro, Mass., discussed "Annealing of Nonferrous Metals in Protective Atmospheres". Mr. Siegel presented a comprehensive report on the most popular atmospheres in use today and their effect on many of the nonferrous metals. During the lively question period which followed the lecture, Mr. Siegel had the assistance of James Hinman, technical adviser, and Nash Demirjian, metallurgist, both of Revere Copper & Brass, Inc., New Bedford, Mass., who answered questions regarding large scale heat treatment of copper and brass.

A. T. Allen of the United Wire & Supply Corp., Providence, delivered the second lecture, "Silver Solders". He discussed the various silver solders and their uses in the joining of nonferrous metals.

The third lecture, "Substitutions", was given by Kenneth H. Mairs, associate professor of metallurgy at the University of Rhode Island. Prof. Mairs discussed the availability of the most widely used nonferrous metals in the New England area, and set forth a very comprehensive list of substitute materials. He presented a comparison of the properties of the original metal and its most suitable substitute.

The series was concluded by Walter France, assistant director of research of the Scovil Manufacturing Co., Waterbury, Conn., who gave a lecture on the "Mill Fabrication of Copper-Base Alloys".

Ft. Wayne Honors Past Chairmen Speakers

A Panel Discussion on the "Various Methods Used to Obtain Desired Physical Properties in Steels" Was Presented by the Fort Wayne Chapter at Past Chairman's Night Recently. Shown are, from left: W. E. Gifford, service engineer, Wolverine Finishes Corp.; Fred C. Lehman, speaker; Paul A. Lauletta, vice chairman; and Walt B. Cheney, speaker. Mr. Gifford, Mr. Lehman and Mr. Cheney were presented past - chairman certificates

Reported by A. D. Carvin
Joslyn Stainless Steels

A panel discussion by three past chairmen on the "Various Methods Used to Obtain Desired Physical Properties in Steels" was prepared for Past Chairmen's Night of the Fort Wayne Chapter. Unfortunately, Herb A. McAninch, chief engineer, Warner Automotive Parts Division Borg-Warner Corp. (chairman, 1948-49), who was to have covered the deep hardening alloy steels, was unable to present his discussion because of illness.

Methods of obtaining the desired physical properties in stainless steels were discussed by Fred C. Lehman, superintendent of the electric furnace department and chief metallurgist, Joslyn Manufacturing and Supply Co. (chairman, 1946-47), and the carburizing grades of steel were handled by Walt B. Cheney, assistant works metallurgist, International Harvester Co., (chairman, 1951-52).

Mr. Lehman opened with a brief history of steelmaking at Joslyn, where they make stainless steel in small ingots (615 lb.). The small ingot is particularly advantageous for stainless steel because it allows the steel to solidify more rapidly, giving smaller grain size. This helps to overcome the tearing of the ingots in rolling, which is troublesome in the large 7000 to 12,000-lb. ingot.

Mr. Lehman noted certain necessary precautions to prevent damage in heat treating plain chromium stainless steels. In cutlery grades slow heating to temperature and extra long soaking at temperature are essential to prevent cracking and insure complete transformation. Thin sections should be quenched in still air and thick sections in oil. Stress-relieving or tempering immediately after the quench is essential to prevent cracking.

Physical properties in austenitic stainless steels are obtained, in the case where it is to be softened, by water quenching from temperatures around 1950° F. Rapid cooling keeps the carbides in solution and prevents their migration to the grain boundaries, thus imparting maximum corrosion resistance. Cold work hardens the austenitic stainless steels to a great degree.

In outlining some methods of obtaining desired physical properties in carburizing grades of steel, Mr. Cheney told how the Fort Wayne Works of International Harvester spent one million dollars to revamp its heat treat department. A good deal of study was made on the hot oil quench (400° F.) of case hardened parts.

This method of interrupted quenching has proven very satisfactory, and the Fort Wayne Works pioneered the word "marquenching" as a name for it.

Quenching in hot oil on the average consumes about 10 min. Parts removed from the quench are stored on racks in still air for 6 hr. to "cure". Parts ½ to 3½ in. thick and weighing ½ to 15 lb. are heat treated by this method.

The most desirable feature of the hot oil quench is freedom from distortion. Physical properties have been increased 10 to 15% and life of parts 100 to 200%. Surface pitting has been reduced, and straightening of parts before grinding is eliminated.

Mr. Cheney showed a very interesting set of slides which illustrated the improvements that have been realized by marquenching.

Past Chairmen's Certificates were presented to Mr. Lehman, Mr. Cheney, and W. E. Gifford, Jr., service engineer, Wolverine Finishes Corp. (chairman, 1947-48), by Paul A. Lauletta, vice-chairman of the Chapter. The remaining five past chairmen had moved from Fort Wayne or were unable to attend because of illness and certificates were sent to them.

Springfield Chapter Hears Talk on Hardenability

Reported by Howard E. Boyer
Chief Metallurgist
American Bosch Corp.

A talk on "Hardenability" was presented by Peter Payson of Crucible Steel Co. of America, to the Springfield Chapter.

The speaker pointed out that knowledge of hardenability was important for three distinct reasons: (1) hardness, yield strength, notch impact, and properties obtainable in large sections; (2) distortion and cracking in hardening; and (3) development of case and core in thin wall sections.

Mr. Payson demonstrated how relative hardenability can be estimated by examination of the TTT-curves of the steel when the steels differ appreciably, and suggested that probably the best definition of hardenability is one which involves reference to the transformation of austenite, namely, the ability of steel to avoid high-temperature transformation with slower rates of cooling from the austenitizing temperature.

The quantitative methods for designating hardenability were discussed at some length. First was the Grossmann scheme of critical bar diameter with an ideal quench, or D_1. The speaker showed that this scheme of hardenability can be calculated by multiplying factors for the amounts of various elements in the steel. He emphasized, however, that calculated hardenability was not as dependable as measured hardenability. The second procedure discussed was the end-quench, or Jominy method. This is most widely used for constructional steels. Because of the good reproducibility of this method it has become customary to specify "H" steels to hardenability limits, rather than to composition limits, to the advantage of customer and steel manufacturer.

Ten Years Ago

Quotes From *Metals Review*

January 1943

"For his work on hardenability and his method of calculating it from chemical composition . . . MARCUS A. GROSSMANN* has been awarded the Robert W. Hunt Gold Medal of the American Institute of Mining and Metallurgical Engineers."

March 1943

"On March 1, 1943, the American Society for Metals reached an all-time high of 16,018 members†—nearly 3000 more than the total membership one year ago."

*A.S.M. past president, now deceased.

†Present membership—22,141.

A.S.M. Sponsors New York Teachers' Course in Metals Technology

New York State is to have the first teachers' course in metals technology ever established at the vocational or high-school level.

The time will be June 15-27, 1953; the place, State Teachers' College, Oswego, N. Y.; the students, top-rated trade and vocational instructors from the vocational and trade schools under the administration of the New York State Department of Education. The faculty has been recruited by the American Society for Metals from the ranks of leading metallurgical engineering professors.

The purpose of the teachers' course in Metals Technology is to properly integrate this technology into the teaching curriculum of the vocational schools in New York State. Through this cooperative effort between A.S.M. and the New York State Department of Education, much can be done to further advance the students' knowledge of the technical and engineering operations in the industries they will later serve as staff members, according to W. H. Eisenman, A.S.M. national secretary.

At Oswego, Metals Technology will become a vital part of the machinists' knowledge; the student of welding will become more expert as a result of his better understanding of the metals involved in his work; the potential draftsman will later be able to approach designing with a practical understanding of how metals behave in finished structures and products.

Ten topics to be covered in the teachers' course at Oswego are:

Atomic Structure of Solid Metals.
Solidification of Unalloyed Metals.
Mechanical Properties of Metals.
Alloys.
Effects of Hardness on Different Metals.
Heat Treatment of Steels.
Tempering of Steels.
Atmospheres.
Classification and Identification of Steels.
Selection of Construction and Toolsteels.

Two top-rated metallurgical engineers will head the teaching staff. Alfred Bornemann, professor of metallurgy, Stevens Institute of Technology, will conduct the lectures on Metals Technology during the first week at Oswego. Carl A. Keyser, associate professor of metallurgy, University of Massachusetts, will direct the course during the second week.

J. Umowski, instructor, Essex County Vocational and Technical High School, Bloomfield, N. J., technical coordinator, will direct laboratory and classroom demonstrations.

In addition to classroom and laboratory activities, the two weeks' course at Oswego will include evening lectures by leaders from industry, who will cover nonferrous metals and their uses in products for both civilian and military uses, and ferrous metals.

The teachers' course in Metals Technology was organized by the A.S.M. Committee on Vocational Education, William F. Collins, United-Carr Fastener Corp., chairman.

Discusses Recent Trends In European Metallurgy

Reported by R. O. Elliott
Los Alamos Scientific Laboratory

Augustus B. Kinzel, president of Union Carbide and Carbon Research Laboratories, Inc., spoke to a special meeting of the Los Alamos Chapter on "Recent Metallurgical Trends in Europe and the United States".

Dr. Kinzel stated that metallurgy in Europe has made a strong comeback since the war. Steel tonnage is increasing rapidly in West Germany, and England and France are also increasing steel production. He likened the coal and iron ore situation in Western Europe to an imaginary one in the United States in which our high-grade Mesabi iron ore would be in one country and our good grade of Pittsburgh coking coal in another. With strong nationalistic feelings in the two imaginary countries it is obvious that steel production would be greatly hampered. The Schuman-Monet plan is counteracting this difficulty in Western Europe by establishing "free borders", thus permitting the high-grade iron ore from Belgium, Luxembourg, and Lorraine to be processed with the coking coal from the Ruhr, thereby increasing steel production. Extension of this plan to other industries is essential for their survival.

Among recent metallurgical trends in the United States discussed were the use of manganese as a substitute for nickel in stainless steels, and the use of low-carbon ferrochromium in stainless steel making. The increased use of manganese stainless steels is the combined result of the nickel shortage and an increased demand for stainless steel. Two manganese stainless steels have come to the fore: 4%, Ni—5% Mn 0.07 C alloy, and a 16% Mn—1% Ni—18% Cr alloy. In general, the appearance and physical properties of the manganese stainless steels are similar to the 18-8 stainless steels. They are especially resistant to attack by sulphides and sulphur-bearing vapors. The general trend in making stabilized stainless steels is away from columbium and tantalum and toward lower carbon contents. This has resulted from the increased production of low-carbon ferrochromium and the use of oxygen in the electric furnace to lower carbon contents and raise the temperature of the bath.

Speak at Worcester Educational Session

At the First Meeting of Worcester Chapter's Educational Course on "The Man in the Shop", Attended by 325 Members and Guests Are, From Left: Joseph C. Danec, Educational Chairman; Stephen M. Jablonski, Metallurgist, Wyman-Gordon Co., Who Spoke on "Forgings"; and J. Walter Gulliksen, General Superintendent, Worcester Pressed Steel Co., Who Spoke on "Stampings". (Reported by C. Weston Russell, Chemist, Wyman-Gordon Co.)

Students Report on Research Programs At Eastern N. Y.

Reported by John M. Gerken
Rensselaer Polytechnic Institute

At the Eastern New York Chapter's "Student Night" this year, graduate students and members of the research staff of the department of Metallurgical engineering at Rensselaer Polytechnic Institute presented reports on the aims and problems of the research programs with which they are associated.

Arthur Backensto discussed the "Powder Metallurgy of Aluminum." Aluminum powder of the sizes generally used for compacting is covered with a relatively thick and adherent oxide coating which represents 10 to 20% of the total weight of the powder. Although this oxide coating has been the source of many troubles in the process, it is believed to be responsible for the remarkable properties of the final product. Tensile strengths of 50,000 psi. at room temperature have been attained with powdered aluminum parts, but of greater importance is the fact that at 400° F., higher strength has been obtained than with any other aluminum alloy.

The production and studying of "Single Crystals of Magnesium and Magnesium Alloys" was discussed by R. R. Nash. Crystals were grown by a modified Bridgman process in a specially designed furnace in which the thermal gradient, from top to bottom, and the cooling rate could be very precisely controlled. These crystals were produced in one phase of an investigation to improve the mechanical properties of magnesium alloys by systemically studying the specific effect of a number of solute elements on the solvent.

"A Method for Examining Behavior of Magnesium Single Crystals Under Action of Low Stresses" was presented by David Krashes. As the stress on a single crystal is increased, the initial creep rate increases linearly with stress up to a certain point, above which the slope changes rather abruptly to a faster linear rate. The point at which the curve departs from the first straight line is considered to be the critical resolved sheer stress for the metal. It is planned to measure this initial creep rate at low stresses using an extensometer based on the principle of interference fringes moving across a pair of optical flats. The optical flats will be mounted on lever arms which are actuated by extension of the crystal.

Work on the "Weldability of Titanium Alloys by the Consumable Electrode Inert-Gas Shielded-Arc Process" was discussed by J. M. Gerken. Thermal cycles were measured in the heat affected zone adjacent to arc welds in titanium plate by measuring the output of thermocouples placed at various distances from the weld centerline. The thermal data thus obtained for several welding conditions were used to construct cams for controlling thermal cycles on a high-speed time-temperature controller. Slightly oversize Charpy impact specimens were heat-treated in this device to these various thermal cycles. The finished Charpy V-notch specimens yielded impact properties for different locations in the heat affected zone for various welding conditions.

John N. Ramsey described work he is doing in determining the "Chromium-Oxygen Constitution Diagram". This problem was attacked using the isotherm method in which samples of pure chromium are heated at constant temperature but under varying oxygen pressures. The samples are analyzed for oxygen content using the vacuum fusion technique. A plot of the oxygen pressure versus the oxygen content of the chromium has a discontinuity at the dissociation pressure of Cr_2O_3. The break in this curve gives one point on the Cr-O diagram.

E. C. Nelson described his work on a "High-Speed Dilatometer in the Determination of Continuous Cooling Transformation Diagrams for Various Steels". Dilation measurements were chosen for measuring subcritical transformation because they can be made remotely from the specimen and simultaneously with transformation. Dilation measurements are made using the relative displacement of two gratings, one fixed and one attached to the specimen. Heating is by induction and cooling by inert gas flow.

Speaks on Vacuum Metallurgy

Leaders at the March Meeting of the Worcester Chapter Were, From Left: Stephen M. Jablonski, Metallurgist, Wyman-Gorman Co., Technical Chairman; James H. Moore, Director of the Metallurgical Department, National Research Corp., Who Spoke on "Vacuum Metallurgy"; and Wendell J. Johnson, Sales Manager, Massachusetts Steel Treating Corp., Chapter Chairman

Reported by Stephen M. Jablonski
Metallurgist, Wyman-Gordon Co.

James H. Moore, director of the metallurgical department, National Research Corp., presented an "Introduction to Vacuum Metallurgy" at a chapter meeting in Worcester.

The speaker traced the history of the field from its early stages through present-day work. He pointed out that advances in the processes were dependent on and followed closely the development of equipment necessary for high-vacuum systems. The basic principles involved with melting systems in vacuum work and the effects of decreased pressures on metals were explained. Mr. Moore also described the lowered solubility of gases in metals at extreme low pressures and pointed out that certain metals volatilize with lowered pressures. This, in some cases, limits the decrease in solubility or degassing possible by vacuum processes.

The metals produced by vacuum metallurgical processes are of high purity and are used principally in the electronics industry. In addition to this, there are some metals which at present cannot be produced without the use of this process. Increases in certain physical properties of metals produced by vacuum metallurgical processes make this type of product desirable for some applications, such as bearings of SAE 52100 material.

Fire at A.S.M. Headquarters

Serious damage was averted recently when the Cleveland Fire Department put out a fire which started in the basement of A.S.M.'s National Headquarters and spread to the first floor. Workers were driven out of the building by the smoke, but damage was confined to the library.

New Films

Continuous Casting

A full-color, 35 mm. sound-slide film, describing the patented ASARCO process for continuous casting of bronze rod, tubes and shapes, has been completed and may be obtained by writing to the Continuous-Cast Products Department, American Smelting and Refining Co., Barber, N. J. It is available to interested groups without obligation. Where possible a lecturer will be provided.

Porcelain Enamel

The Porcelain Enamel Institute has completed a new 60-frame, full-color strip film "Porcelain Enamel, the Lifetime Material of a 1000 Uses". To accompany the film an information script has been prepared which tells the complete porcelain enamel story. Both the strip film and the script have been produced along non-technical lines to form a narrative-type presentation covering the early history, composition, methods, spraying and firing and properties of porcelain enamel.

The film, which will be used in conjunction with the Institute's recently organized nation-wide Speakers' Bureau being directed at college groups, is available from the Porcelain Enamel Institute, 1346 Connecticut Ave., N.W., Washington 6, D. C.

The Science of Making Brass

A color film, produced by the Chase Brass & Copper Co., showing step by step the processes of making brass sheet, rod, wire and tube. Contains dramatic close-ups of casting, extruding, piercing, drawing and rolling, with animated sketches of what takes place inside these machines. Runs 25 min. The film is available from Chase Brass & Copper Co., Waterbury 20, Conn.

Foundry Course Offered

A practical course in "Foundry Practice", endorsed by the Education Committee of the New York Chapter of the American Foundrymen's Society, is being offered at the Machine and Metal Evening Trade School. The course is designed for beginners and others wishing to improve their skills. It is suitable for men with technical backgrounds who wish to obtain practical knowledge of foundry work. Instruction will be given in green sand molding, coremaking, melting and pouring of metal. Instructors are men with years of trade and teaching experience. There is no charge.

For further information, write to: Frank M. Kinsler, Teacher-in-Charge, Foundry Practice Course, Machine and Metal Evening Trade School, 320 East 96th St., New York 23, N. Y.

Armed Forces Honored in Boston

Armed Forces Day of the Boston Chapter Featured, From Left: C. Lutts, Co-Technical Chairman; B. S. Mesick, Watertown Arsenal, Who Spoke on "Materials, Keystone of Ordnance Design"; P. D. Gold, Jr., Boston Naval Shipyard, Who Spoke on "Metals in the Navy"; and P. Kosting, Co-Technical Chairman

Reported by William F. Collins
United-Carr Fastener Corp.

The Boston Chapter observed Armed Forces Day in March. Activities began with afternoon visits to the Watertown Arsenal and the Boston Naval Shipyard. Visitors at the Arsenal had an opportunity to see centrifugal casting operations, heat treating, heavy machinery operations, laboratory testing, titanium exhibits and atomic weapons.

At the Shipyard, points of interest included the world-famous ropewalk, chain shop, foundry, machine, X-ray, and metal testing laboratory, and the cruiser Columbus, and Old Ironsides. Following the visits, the members met for a dinner and technical meeting. The Chapter was honored by the presence of B. S. Mesick, commanding officer of the Watertown Arsenal and P. D. Gold, commander of the Boston Naval Shipyard, both of whom gave excellent talks on the operations under their command.

Capt. Gold spoke on "Metals in the Navy", and outlined not only the materials being used, but also methods of inspection. The X-raying of hulls of submarines which shows up readily defects in welds was described. Magnafluxing of shafting for cracks and surface defects and ultrasonic testing were also explained. In the manufacture of die lock anchor chains for aircraft carriers and mine sweepers, different metals had to be developed. In the ropewalk, where all the rope used by the Navy has been manufactured since 1834, copper methenate has been added to the process to prevent mildew and decay. Nylon rope is now being made which is twice as strong as manila and has from 4-5 times the elongation.

Col. Mesick spoke on "Materials—the Keystone of Ordnance Design". He stated that the first metallurgical laboratory in the United States was established at the Watertown Arsenal. At the beginning there were very few materials to test, but today the Ordnance Department uses over 10,000 different types, classes and grades of materials. The Ordnance Department, with the aid of industry, of the technical societies, and of the American Ordnance Association, is continually striving to develop materials to meet the more rigid specifications demanded for military equipment now being made. Boron and rare earth elements are becoming more popular in the use of armor plate. New nodular cast irons are being used as shell bodies, and titanium and its alloys are certain to be used where weight is an important factor. They have excellent corrosion resistant properties, can be readily welded in light sections, and can be forged quite easily, and hot formed or cold worked. Titanium has high strength and impact properties and when it can be manufactured more economically, it will find its place for many commercial uses.

Adds to Sauveur Memorial Museum

A copy of the Sauveur Memorial Lecture before the Boston Chapter A.S.M. on Jan. 16, 1953, has been presented to the Society's national headquarters for preservation in the Sauveur Memorial Museum. The lecture was given by H. H. Lester of Watertown Arsenal, a past chairman of the Boston Chapter, and is entitled "Albert Sauveur and Metals Research—an Appreciation".

The address contains a history of the establishment of the Sauveur Museum, and then traces the effect of Sauveur's research and teachings on the growth of metallurgical science and practical research. The author stresses the importance of materials and shows the close interrelationship between property characteristics of materials and growth of culture. Professor Sauveur, he shows, symbolizes the constructive instinct and the spirit of research by means of which civilization marches on.

Reports on Vanadium in the Steel Industry

Reported by Paul R. Totten

Thomas Strip Division
Pittsburgh Steel Co.

T. W. Merrill, chief metallurgical engineer, Vanadium Steel Corp. of America, spoke on "Vanadium in the Steel Industry" at a recent meeting of the Warren Chapter. He discussed the application of vanadium in steel in two categories, as a process alloy in the making of steel, and as an alloying element to benefit specific properties of steel.

As a process alloy, very small amounts of vanadium, between 0.03 and 0.08%, are added to the steel as it is tapped from the furnace, Mr. Merrill stated. Such an addition refines the as-cast structure of large ingots and castings, resulting in several important benefits to processing characteristics such as forgability and uniformity of mechanical properties in the finished steel. The smaller grain size, and better transverse mechanical properties, as well as lack of excessive segregation in large sections resulting from the addition of vanadium were described. Vanadium can reduce appreciably the extent of heat treatment required to obtain the necessary properties in forgings. The more recent development of adding vanadium to rimming steel to prevent aging during deep drawing is important to the producers of sheet steel, the speaker said.

Toolsteels represent the largest use of vanadium as an alloying element in the usual sense of the word. Vanadium-rich carbides are between aluminum oxide and silicon carbide in hardness, and, when dissolved in austenite, have the property of precipitating in an extremely fine particle size and resisting coalescence at elevated temperatures to a greater extent than other carbides. These properties of vanadium carbides are responsible for the phenomenon of secondary hardening to which vanadium steels owe many of their unusual properties. Mr. Merrill stated that, on the whole, the secondary hardening of vanadium steels is more significant than their hardenability, although small additions of vanadium appear to have an unusually great effect on this latter property. Larger amounts of vanadium, most of which do not dissolve in the austenite during heat treatment, actually decrease hardenability. An important utilization of this property is the addition of vanadium to steel to improve weldability. Steels which are not hardened by quenching but are cooled in air (or more slowly), can be improved greatly in yield strength by vanadium, especially in heavy sections.

Mr. Merrill predicted that vanadium, which, incidentally, has become largely a domestic alloy, would be of increasing importance in two types of applications: first, more use as a process alloy in very small amounts to promote uniformity and to benefit properties apparently influenced by the gaseous elements; and second, in larger amounts for stabilization of properties at elevated temperatures, such as in tools and turbine parts.

Alloys of Iron Research Papers To Be Published

Results of world-wide researches into the effects of adding various metals to iron and steel are now being readied for publication by Alloys of Iron Research. Sponsored by the Engineering Foundation, the new monograph series embodies the type of exhaustive, critical review of research and literature that set the pattern for previous volumes in the original series started in the 1930's.

"Aluminum in Iron and Steel", by S. L. Case and K. R. Van Horn, the first of the new series, will be released in June. Four more volumes, to be published about six months apart, are already in preparation. They will cover the effects on iron and steel of: (1) nickel; (2) manganese; (3) titanium; and (4) columbium, zirconium, boron, tantalum, and calcium.

Alloys of Iron Research was reestablished in 1946 after four years of war-enforced inactivity. At that time, authorities selected by the Iron Alloys Committee of the Engineering Foundation began to revise partially completed manuscripts and to prepare new monographs on elements of rapidly increasing importance. The new monograph series will appear under the imprint of John Wiley and Sons, Inc.

From the Metal Showman

IN an historic action in Philadelphia last Oct. 22, the 22,000 members of the American Society for Metals voted unanimously to set aside an initial sum of $650,000 to set up a Foundation for Education and Research.

Keyed to the basic provisions of the Society's charter the new Foundation is the largest ever established by a technical society from its own funds.

The income from the fund will be used to advance the two areas with which the organization is deeply concerned—stipulation and recruitment of engineering students and pure research in metals technology.

The decision to launch the Foundation was preceded by more than a year of careful study by a committee of past presidents and current officers of the Society.

During the course of their research, the study committee observed an alarming decrease in the number of engineering graduates from U. S. universities. The greatest decline was due to occur at a time when the professional manpower needs of both military and civilian industries were mushrooming.

The American Society for Metals, as the representative for the industry employing the largest number of engineers in our economy, felt obligated to undertake a program of recruitment and research.

During its first year, the Foundation provided an income of $30,000 to be used for the "advancement and dissemination of scientific knowledge, particularly with respect to the technology of metals".

The true impact of the A.S.M.'s action will not become evident immediately, but the industry can look forward to greatly stimulated interest in engineering education in the future. Moreover, basic research projects, under the sponsorship of the new Foundation, inevitably will result in product development, new applications and the subsequent creation of new markets for metals manufacturers everywhere. The ever widening ripples of attention and interest created by the Society's scholarships and research programs are bound to give engineering education and recruitment a shot in the arm for years to come. And each new engineering graduate, helped through his studies by an A.S.M. grant, will become a candidate for a job in the laboratory or on the production floor of talent-hungry metals concerns.

The 1953 A.S.M. Foundation Board of Trustees includes: Harold K. Work, director of research of the New York University College of Engineering; Arthur E. Focke, head of materials development for the Aircraft Nuclear Propulsion Project of the General Electric Co., Walter E. Jominy, chief metallurgist in the research department of the Chrysler Corp.; John Chipman, head of the department of metallurgy at Massachusetts Institute of Technology; and Ralph L. Wilson, director of metallurgy, of the Timken Roller Bearing Co., and 1953 president of the American Society for Metals.—From THE METAL SHOWMAN Vol. 1—No. 2.

Future Casting Practices Outlined at Rhode Island

Reported by Warren M. Hagist

Ass't. Professor of Mechanical Eng.
University of Rhode Island

"Future Casting Practices", with emphasis on recent foundry research, was the subject of the talk presented by Mel Adams, assistant professor of metallurgy at Massachusetts Institute of Technology, to the Rhode Island Chapter.

Prof. Adams stated that widespread use of castings for critical engineering applications is limited by lack of detailed information concerning freezing of metals, and that many castings are being made substantially as they were 400 years ago. What little is known of solidification has yet to be extensively applied usefully to casting practices. Current research

Mel Adams

is uncovering developments which will radically influence future casting procedures, and which will take advantage of properties obtainable in cast structures solidified under positively controlled conditions.

Prof. Adams discussed Al, 4% Cu solidified under conditions leading to steep temperature gradients, which with the liquid portion being vigorously stirred, exhibits strength twice that normally expected. He stated that the application of heat transfer principles to risering and casting design can affect large improvements in metal saving economy, and also the mechanical properties of cast metals. Further application and investigation of heat transfer phenomena will extend the field of casting metals into metal molds, and will bring the die casting of steel into reality.

Offer Testing Services

Kenneth Tator Associates, Coraopolis, Pa., have announced the establishment of a custom corrosion testing service for industrial environments. Selected industrial exposures, under rigorous control, are made available to manufacturers of industrial coatings and other corrosion mitigating methods for objective testing of their products.

The new test stations are located in the plants of large industrial companies. Exposures are made directly to plant fume environments such as organic and mineral acids, ammonia, organic solvents, entrainment of corrosive chemicals, high humidity conditions, radiant heat, salt, mildew, and heavy industrial. Other stations are to be added as demand develops.

Ottawa Chapter Hears Metal Lubrication Talk

Reported by A. S. Vince

Metallurgist
Royal Canadian Mint

I. E. Puddington, director, division of applied chemistry, National Research Council, Ottawa, presented a talk on "The Lubrication of Metals", from the viewpoint of the physical chemist, at a meeting of the Ottawa Valley Chapter.

Dr. Puddington discussed the work of Reynolds and Bowden on the effect of lubricants, and physical condition, speed, and load on frictional forces. The effect of oil films, and films of soft metals such as indium, along with the conditions of boundary and full fluid lubrication, were also explained. A number of slides illustrated Dr. Puddington's lecture. One demonstrated the power required to move a shaft plotted against the viscosity of various lubricants measured at the equilibrium bearing temperature. It showed that as viscosity increases, power, and consequently equilibrium temperature of the bearing, increases.

The speaker explained that one of the major disadvantages of oils for some types of bearings was their tendency to leak away, but this can be overcome to a great extent by the use of suitable greases. These greases are mixtures of a fibrous soap and an oil, and as the rate of shear increases, the viscosity of the mixture approaches that of the oil constituent. This means that the grease on the outside of the bearing, being sheared at a low rate, has high viscosity and little tendency to leak away, while that on the bearing surfaces is undergoing rapid shear, and has low viscosity and good lubricating properties. These thixotropic properties of the grease therefore are most useful, but unfortunately are affected by the temperature of operation, each type of grease having a characteristic minimum thixotropy at a given temperature, which limits its usefulness to certain temperature ranges. This is due primarily to phase changes in the soap structures.

In conclusion, some modern developments involving the use of specially prepared bentonite and silica in the form of a dehydrated gel, filled with lubricant, were discussed. The speaker stated that the silica particles below a certain size caused no abnormal wear and that in these greases the thixotropy had the characteristic of being independent of temperature over wide ranges.

Chapter Hears Lecture on Metallurgy of Watchmaking

Reported by D. G. Livingston

Hill-Chase & Co.

Past-Chairmen's Night of York Chapter featured Harry Hovis, chief chemist and metallurgist, Hamilton Watch Co., who discussed "Chemistry and Metallurgy in Fine Watch Making". He explained the intricate workings of watch mechanisms, as well as timing devices used in the defense programs.

Steer Oregon Educational Course

Standing at the Blackboard During a Demonstration of One of the Educational Lectures on "Practical Heat Treating of Steel" Presented by the Oregon Chapter Is Olaf G. Paasche, Course Instructor; and Seated, From Left, Are: James Bates, Educational Committee; William Bristow, Pacific Machinery & Tool Steel Co., and Harry Czyzewski, Metallurgical Engineers, Inc. Mr. Bristow and Mr. Czyzewski were members of the panel of experts answering questions after the lectures. (Reported by G. E. Healy)

The Aluminum Processing Panel at the A.S.M. Regional Conference Was Composed of, From Left: C. B. Curtis; E. Zulinski; C. F. Geisewite, Moderator; T. F. McCormick; and E. J. Cenek

R. L. Wilson (Third From Left), A.S.M. National President, Discusses His Talk on "Current Developments in the Ferrous Metal Field" With W. K. Hunt, F. T. McGuire, and A. J. Andre

Metallurgists Who Made Up the Panel on the Cold Working of Metals Were, From Left: Freeman Anderson; A. E. Sweet; Don Nulk; Wilhelm Olsen; and A. J. Andre, Moderator of the Panel

Iowa Conference On Metal Processes

Reported by C. H. Savery
French & Hecht Div. of Kelsey-Hayes Wheel Co.

The American Society for Metals Regional Conference of the Cedar Rapids, Des Moines, Peoria, Rockford and Tri-City Chapters was held in Davenport, Iowa, on April 2 and 3.

Ralph L. Wilson, president of the Society, featured speaker at the Conference, stated that new developments in the processing of metal alloys show the United States will continue to lead the world in production as machines with longer lives and increased strength are reaching production lines. Many metals in the alloy field are still on the critical supply list. However, metallurgists are making headway in relieving the pressure by developing new formulas.

The program of the Conference included the following sessions:

"Application and Heat Treatment of Modern and Emergency Constructional Steels", with C. W. Ray, materials engineering department, Deere & Co., moderator, and M. L. Frey, Allis-Chalmers Manufacturing Co., John D. Graham, International Harvester Co., J. R. Sloan, Caterpillar Tractor Co., and L. W. Steege, John Deere Waterloo Tractor Works, members of the panel.

"Metallurgical Progress in Israel", with H. Bornstein, chief technical consultant, Deere & Co., moderator and speaker. Mr. Bornstein recently returned from Israel after completing a 6-months appointment with the Technical Assistance Administration of the United Nations.

"Cold Working of Metals", with A. J. Andre, sales engineer, E. F. Houghton & Co., moderator, and F. Anderson, National Lock Co., Don Nulk, Solar Aircraft Co., W. Olson, Atwood Vacuum Machine Co., and A. E. Sweet, Maytag Co., members of the panel.

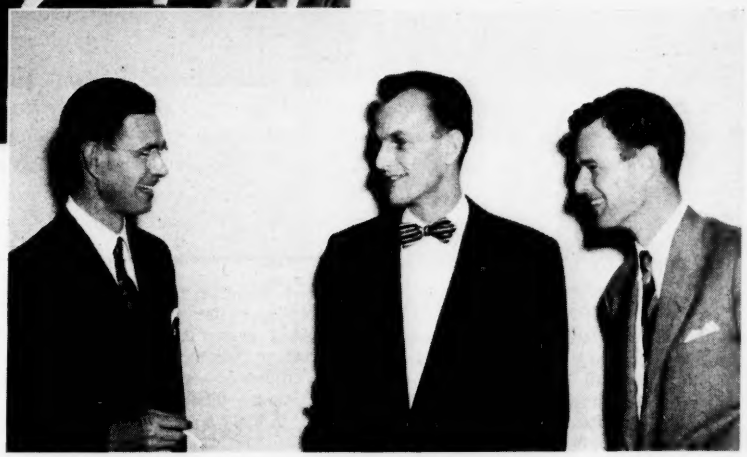
"Aluminum Processing", with C. F. Geisewite, chief plant metallurgist, Davenport Works, Aluminum Co. of America, moderator. E. J. Cenek, Reynolds Aluminum Co., spoke on "Fabrication of Aluminum Sheet"; C. B. Curtis, Maytag Co., on "Heliarc Welding of Aluminum Parts at Maytag"; T. F. McCormick, Aluminum Co. of America, on "Fabrication of Aluminum Extrusions"; and E. Zulinski, Progressive Welder Co., on "Spot Welding of Aluminum".

W. W. Warner, commandant, spoke on the "Rock Island Arsenal and National Defense".

"Design Evaluation as Related to Materials and Processes", with S. D. Gralak, Deere & Co., moderator, and William Gustin, John Deere Waterloo Tractor Works, J. A. Halgren, International Harvester Co., and Dan Shotwell, Caterpillar Tractor Co., members of the panel.

Philadelphia Inaugerates Junior Section

At Left Is Shown Part of the Group Attending the First Meeting of the Junior Section of the Philadelphia Chapter. Below, from left, are: A. M. Bounds, Philadelphia Chapter Chairman; Edmond Tyminski, who spoke on "Nondestructive Testing"; and E. A. Fleming, Crucible Steel Co. of America, Junior Chairman



Reported by A. M. Bounds
Chairman, Philadelphia Chapter

Another "first" for the Philadelphia Chapter A.S.M. will have to be chalked up as a result of its new Junior Section, recently organized at an informal meeting. Since the initial meeting, much progress has been made in giving this Junior Section a place of real importance in the activities of the Philadelphia Chapter. The Junior Section held its first official meeting in February. To start things off, Philadelphia Chairman A. M. Bounds appointed temporary officers and directors for the Junior Section.

The directors consist entirely of senior members of the Philadelphia Chapter who were appointed to the Junior Section Advisory Committee. Temporary officers of the Junior Section are: E. A. Fleming, Crucible Steel Co. of America, chairman; E. F. Eiswerth, Superior Tube Co., vice-chairman; and J. Ballantyne, U. S. Steel Corp., secretary-treasurer.

The Juniors are starting out with five standing committees: program, entertainment, membership, publicity and by-laws. At the first meeting, Junior Chairman Fleming appointed a nominating committee for the permanent officers and directors of the Junior Section. It is anticipated that these officers will be installed at a joint meeting of the Chapter and the Junior Section early in June. Although the Junior Section is to have its own separate meetings, it was thought advisable to schedule a joint meeting as the last Chapter meeting of the season.

The first meeting was addressed by Edmond Tyminski of the Westinghouse Gas Turbine Division. He spoke on "Nondestructive Testing". There were 44 Juniors present.

Chairman Bounds pointed out that many of the Juniors and prospective Juniors attend the evening course in physical metallurgy at Temple University. This course conflicts with the regular meeting night of the Philadelphia Chapter. Thus, when the Junior Section meeting night is changed, the attendance will be greatly increased. There has been no group heretofore which would appeal to the young technicians receiving their certificates from the evening course, a strong point in favor of the new Junior Section.

Junior Chairman Fleming states that the main objective for the Juniors is to present an interesting program and one which deals in basic fundamentals particularly suited to a group in the Junior age bracket. He said that meetings of a more highly technical nature will be held from time to time to balance the interest of those who would want this type of program.

As presently conceived, the Junior Section has its own separate officers and committees. The directors, however, consist of the Senior Chapter chairman, a group of men from the Chapter appointed by the Chairman, and two past Junior chairmen. Financial control will remain with the Senior Chapter group.

Chairman Bounds expects the Junior Section will eventually have about 200 members, and that attendance at the Junior meetings will average from 75 to 100. The percent of attendance against total membership of the Junior group will be considerably greater than that of the Senior group, and a greater enthusiasm as well as more free time to spend on this sort of thing among the Juniors is already evident.

Quality Control Convention

The American Society for Quality Control will hold its 7th Annual Convention from May 27 to 29, 1953, at Convention Hall, Philadelphia. Some 70 speakers will present papers covering nearly every type of industry. Educational series based on advanced techniques in statistical control will be presented, and more than 70 exhibits will be presented by manufacturers to show the latest in equipment and design of their products.

Crane Co. to Expand

Officials of Crane Co., Chicago, one of the top manufacturers of valves and fittings, announced plans for a plant that would make the firm the biggest U. S. producer of titanium metal. Crane is now completing a contract with the government for construction of a $25-million plant that will have an annual output of 6000 tons. The output of the plant will be in the form of sponge metal that will be converted into an equivalent weight of ingots for mill fabrication. The company expects to get into partial production within 12 or 18 months. Site of the proposed plant has not been decided definitely as yet.

Marcus Grossmann Night at Mahoning

The Annual Marcus Grossmann Night Held by Mahoning Valley Chapter Had James E. Phillips, Metallurgist, Cold Metal Products Co., as Guest Speaker. Shown above are, from left: K. L. Fetters, assistant to the vice-president, Youngstown Sheet and Tube Co.; Mrs. Grossmann, guest of honor at the meeting; Mr. Phillips; and T. E. Eagan of Cooper-Bessemer Corp.

Reported by Eugene M. Smith

Development Engineer
Youngstown Sheet and Tube Co.

Marcus A. Grossmann, nationally known metallurgist who, at the time of his death in May 1952, was advisor—research and planning for U. S. Steel Corp., returned in spirit to his home town to be honored in memorium by the Mahoning Valley Chapter in March.

James E. Phillips, metallurgist for Cold Metal Products Co., was chosen as this year's Marcus Grossmann lecturer. He spoke on "Properties of Cold Rolled Steel". He presented the methods for determining the mechanical properties of cold rolled steel by means of slides. Values were shown for the entire range of carbon steels and the more commonly produced stainless steels. He gave a description of the use of various grades of steel dictated by the mechanical properties.

Mrs. Grossmann was a guest of the Chapter for this meeting.

Relation of Materials To Chemistry Is Topic At Birmingham Meeting

Reported by James C. Farlow

American Cast Iron Pipe Co.

A recent joint meeting of the Birmingham Chapters of the American Society for Metals, Committee A-1 on Steels, American Society for Testing Materials, and the American Chemical Society, featured Harold Lee Maxwell, supervisor of mechanical engineering consultants, E. I. duPont de Nemours & Co., and president, A.S.T.M. He spoke on "Chemical Developments and Engineering Materials".

Through constant advances in the field of metals, we have been raising our standards of living, and by developing better metals to meet the needs of our constantly improving civilization, we have metals now that were unheard of during the first world war. These metals have allowed industry to increase production, and to develop new processes and materials, and helped to give the United States its present high industrial standing among the nations of the world.

The trend in the chemical industry is towards new materials developed through highly specialized skills, and new engineering materials that can withstand the high pressure and corrosive conditions common to the chemical industry. Through the use of materials now available the chemical industry has been able to replace old processing methods with new, thus increasing production many times, and cutting production and maintenance costs sharply.

The decision of the proper engineering materials to use depends on their corrosion resistance, work ability, contamination, and maintenance cost, and production loss due to breakdown. By making a complete engineering study of a manufacturing process it is frequently found that the higher cost of better materials is adequately compensated for if the cost of production loss, due to high cost of maintenance on cheaper materials, is considered. Therefore, a complete engineering study should be made before materials are selected for a job.

Plastics show high potential for use in the chemical industry. Some of the advantages of plastics over metals are that maintenance painting is avoided, they are light and easy to support, have smooth surfaces which reduce flow resistance, require less maintenance and installation cost, and are cheaper from a cost standpoint.

The production of synthetic fibers and other chemical products has been able to improve only as the quality of the engineering materials used has improved. Through the improvement of these materials thousands of new jobs have been created, with a resultant higher standard of living. We can maintain this present high standard of living only by developing new ideas and through research. In checking an idea to see if it is good, the design engineer should ask the following questions: Is it sound? Is it simple? Is it modern?

Rocky Mt. Hears How Alloy Additions Affect Steelmaking

Reported by Clyde O. Penney

Chief Metallurgist

Denver & Rio Grande Western RR.

The principal speaker at the March meeting of the Rocky Mountain Chapter was H. P. Rassbach, metallurgical engineer in the technical services and development department of the Electro Metallurgical Co., who presented a talk on "The Effects of Alloy Additions in Steelmaking".

A considerable portion of Mr. Rassbach's talk was devoted to a study of the functions of the various gases, particularly oxygen, nitrogen and hydrogen, in the production of steel, and the effects of these gases on the steelmaking process and the properties of the finished steel products. Many excellent slides were presented to illustrate the effects of these gases on the slag-metal relationships, bath deoxidation, melting losses, and the type and distribution of the inclusions in the finished steel.

Of particular interest was the point brought out that major steel producers are now utilizing a gas, nitrogen, added as a chromium-alloy addition agent to conserve nickel in the production of austenitic stainless steels.

Speakers Available

Chapter officers planning technical programs may be interested to know that the Reynolds Metals Co. has offered the services of its staff of engineers to speak before technical groups on aluminum and its production, uses, fabrication and related subjects. Names of available speakers may be obtained by writing to: Ray B. Smith, Director, Engineering Standards and Data Products Department, Reynolds Metals Co., 2500 South Third St., Louisville 1, Ky.

Tells Advantages of Electric Furnace Steel Production

Reported by J. B. McNichol

Metallurgist
Algoma Steel Corp., Ltd.

The Northern Ontario Chapter was fortunate in having Harry F. Walther, superintendent of melting at the Timken Roller Bearing Co., as guest speaker at a recent meeting. Mr. Walther spoke on "Steel Production in Electric Furnaces".

The first electric furnace in North America was installed at Sault Ste. Marie, Ont., in 1903 and operated until 1906. Electric furnaces are becoming increasingly important in the production of special alloy and high speed steels. Electric furnace steel production has increased from 2.5% in 1940, to 7.5% in 1952. Some of the reasons behind this increased production are: The electric arc furnace can produce any type of steel which is produced in the openhearth; production costs in modern electrics are comparable to most nonintegrated openhearth shops and are approaching these obtained in integrated shops; the modern top-charge electric has made obsolete many of the smaller door-charge electrics as well as many cold scrap openhearths; high alloy steels including stainless types can be made successfully in electrics only; electric furnaces may be shut down and started up easily, a decided advantage during forced shutdowns or short work week; conservation of oxidizable elements, particularly manganese and chromium, is important in electric production; power costs have remained stable and probably will continue to do so while other sources of energy have increased tremendously; quality of steel produced, particularly alloy, is decidedly in favor of the electric; capital outlay required for comparable tonnage is greatly in favor of the electric; and plant layout for electric production is much improved.

Two problems in connection with electric steelmaking still require solution. First, for obvious reasons, fuming in the shop is not desirable. Much time and effort is being expended to solve the problem. In addition, where plants are located in congested areas, the problem becomes one of civic concern and regulation. This applies to the openhearth as well. Secondly, as more electrics are built, the impact on the scrap market becomes more intense. It appears that several more million tons annually can be produced without much trouble. However, other charge materials, such as molten iron and blown metal, are being developed to supplement scrap charges.

An interesting sidelight for the future is the possible use of atomic energy as a source of cheap power. Mr. Walther indicated, however, that it would be a number of years before this power could be controlled.

Mr. Walther described a device known as the "induction stirrer". A Swedish film illustrated the uses of the stirrer in electric furnace steel production. Consisting of an electric core winding in a magnetic field, the stirrer can be used on any melt that is electrically conductive. It is placed beneath the furnace and has many production advantages. The steel bath with the stirrer becomes chemically homogenous and maintains a uniform temperature throughout. With this device it is possible to lower the sulphur and phosphorus contents of steel down to very low percentages. It is easy to operate and allows accurate sampling of the heats of steel.

Wilson Speaks at Golden Gate

R. L. Wilson, A.S.M. National President, Spoke in March at Golden Gate Chapter on "Strength of Steels at High Temperatures". Shown are: H. Krayenbuhl, Oliver United Filters, secretary; Bob Johnston, General Motors Corp., chairman; Mr. Wilson; and G. E. Hersma, publicity committee

Philadelphia Concludes Technical Writing Course

Reported by A. A. Bradd

Engineer, The Midvale Co.

"Effective Technical Writing" was the topic of the recently concluded Educational Lecture Series given by the Philadelphia Chapter.

The course attracted the largest audience that has attended an educational series in recent years. As many as 250 were present at some of the sessions. As a result of the interest shown in the A.S.M. lectures, the Philadelphia Engineers' Club is considering giving a similar course every year.

The four instructors who gave the course presented the fundamentals of good technical writing and showed how to utilize simple approaches and formulas that lead to more effective writing when followed.

C. A. Brown, chairman, English and psychology departments, General Motors Institute, Flint, Mich., presented "Are Your Reports an Asset—or a Liability?"; W. E. Hunt, assistant to marketing manager, General Electric Co., Philadelphia, talked on "Effective Presentation of Technical Papers"; J. H. Jackson, supervising metallurgist, Battelle Memorial Institute, spoke on "Report Writing for Industrial Research"; and J. C. Moore, manager of sales promotion, E. I. duPont de Nemours Co., Wilmington, Del., presented "Modern Technical Sales Report Writing".

York Chapter Completes Series of Lectures on The Machining of Metals

The York Chapter recently completed a course on "The Machining of Metals". The series consisted of three lectures, all of which were very well attended and proved beneficial to attending members.

The first lecture, "The Machining of Stainless Steels", by E. Von Hombach, research engineer, Carpenter Steel Co., covered the formula for greatly increasing machining speeds on stainless. Proper and accurate tool grinding, fine surface finish on cutting edges of tools, coolant in the right place under plenty of pressure, and rigid and husky machining tools with enough horsepower to do the job are necessary to increase the speed, Mr. Von Hombach stated.

"How to Machine Aluminum", the second lecture, by R. H. Simon of the Aluminum Co. of America, was an outline of the practices employed in machining aluminum with hand and machine tools. He discussed the merits of free cutting of soft aluminum alloys and the proper design of cutting tools and compounds.

Ira T. Hook, research engineer for the American Brass Co., discussed "The Mechanics of the Machining of Copper and its Alloys" at the last lecture in the series. He confined his talk to the fabricating methods used in working copper, brasses and bronzes.

Cites Future Trends In Steelmaking

Reported by Walter Showak
Pennsylvania State College

D. W. Murphy, research engineer, Bethlehem Steel Co., spoke on "Steelmaking Processes" before the Penn State Chapter recently. After discussing present improvements, the speaker speculated on the future trends in steelmaking practice.

He pointed out that the number of ingot tons of steel produced in this country has been increasing annually and has already passed the 100-million mark, with the next goal set at 120-million ingot tons. The greater portion of this large tonnage sells for only a few cents a pound, the speaker noted. The steelmaking industry cannot afford to employ new processes which would increase steel production and at the same time increase the cost per ton of steel.

The steelmaking process may be summed up as consisting of securing a container of liquid which is made up mostly of the element iron, then adjusting the composition of the bath to some perviously determined pattern. The steelmaking operation can be broken down into two main operations, melting and refining. Melting, being physical in nature, need not be carried out in the steelmaking unit. The refining operation, being chemical in nature, must be carried out in the steelmaking unit. The supply of oxygen in this latter operation is important.

The large ingot capacity in the United States can be attributed to three processes, the basic openhearth, basic electric, and acid bessemer. The basic openhearth produces the greatest tonnage of steel. Aside from the advantages of being able to remove phosphorous from the liquid steel and utilizing solid steel scrap, the basic openhearth has another great advantage in its ability to handle large quantities of hot metal which dilute those residual elements often found in the scrap.

Economical steelmaking means fast melting and much of the additional capacity can be attributed to new melting facilities, while another portion has resulted from improved operation of existing facilities. Large quantities of heat are necessary for basic openhearth practice, and in years gone by, 12 hr. heats using 5 million B.T.U. per ton were common. Today, there are shops averaging 8 hr. heats with heat consumption under 3 million B.T.U. per ton. The thermal efficiency of the basic openhearth furnace today is about 40%, and 70% for the basic electric. These are fairly high values and it is doubtful that there will be any great increase in the efficiencies of these processes in the future.

Heat Resistant Cast Alloys Topic of Meeting in Dayton

Reported by D. C. Heckard
Research Laboratories
Armco Steel Corp.

The metallurgy of commercial "Iron-Chromium-Nickel Heat Resistant Cast Alloys" was discussed by C. R. Wilks of the American Brake Shoe Co. in Dayton. Like most other classes of metals there are ranges of the various alloying elements which can be used, depending on the qualities which are desired in the final product. Of the many cast heat resistant alloys in use today, the most common are the 26% Cr—12% Ni and 16% Cr—35% Ni types which make up about 75 to 80% of the annual production.

Functions of component elements were reviewed. Iron is the economical base material to which chromium is added for oxidation of scaling resistance. Nickel is added for control of structure, thereby producing stronger materials. Carbon content is higher than in similar wrought alloys for fluidity in casting and higher strength. The main heat resistant alloys are primarily austenitic in structure, for stability and high hot strength. 26% Cr—12% Ni might be considered the basic heat resistant alloy for 1800° F. service. Chromium and nickel are at about a minimum for economy in service at this temperature level. Excellent stability and hot strength can be obtained by proper balancing of composition to produce a stably austenitic structure. The 16% Cr—35% Ni alloy is recommended where exposure to carburizing atmospheres or severe cyclic temperature conditions prevail. For economy at lower temperatures, 21% Cr—9% Ni should be considered. Oxidation resistance is satisfactory to 1600° F. and hot strength is equivalent to that of the balanced 26% Cr—12% Ni grade.

Gives Talk on Die Castings in Minnesota

Reported by Arnold Bowers
Metallurgical Department
Minneapolis-Moline Co.

A recent meeting of the Minnesota Chapter featured H. E. Shepard, vice-president of engineering and sales, Rupert Diecasting Co., who spoke on "Die Casting". He introduced his talk with an excellent sound movie on die casting which was shown through the courtesy of the New Jersey Zinc Co.

Zinc and aluminum alloys are the main types of metals used by the die-casting industry. The molten metals are forced into the steel dies at pressures of 1500 to 2000 psi. To produce sound castings with a minimum amount of die wear, the molten metals must not be abrasive and must possess good fluidity. The zinc alloys excel in fluidity and are not abrasive, whereas the aluminum alloys are gummy and quite abrasive. The aluminum alloy, therefore, presents more problems in casting and requires more maintenance work on the dies. Very close chemical control of the alloys is necessary to produce dimensionally stable castings with good physical properties.

Proper die design is most important in die casting. Sudden changes in thickness and sharp corners cause turbulence in the metal flow which will result in porosity in the casting. The die should be so designed that the metal will have a smooth path to the farthest recess of the die.

Some of the many advantages of die castings are the minimum amount of machine work after casting, good corrosion resistance, the close size tolerance, good physical properties, and good finish.

Schedules Conference on Nuclear Engineering

A Conference on Nuclear Engineering is currently being arranged for presentation at the University of California, Berkeley, Sept. 9 to 11, 1953. The major purpose of the Conference is to provide a high-level technical program of contributed papers by and for personnel working in nuclear engineering and closely related fields. The University of California invites all persons interested to submit titles and abstracts of papers to be considered.

Papers should deal with selected, unclassified or declassified results of investigations concerned with the utilization of nuclear reactions. It is expected that the program will feature technical and engineering-economic studies of nuclear power plants, other reactors, isotope production and separation, and isotope applications. Several invited speakers will present papers, providing reviews and integrated discussions of important topics and problems in the field.

Persons interested should write: Prof. R. A. Fayram, 208 Mechanics Bldg., University of California, Berkeley 4, Calif.

Wilson at Detroit

Reported by D. N. Frey
Scientific Laboratory,
Ford Motor Co.

Ralph L. Wilson, A.S.M. national president, was honored at National Officers Night in Detroit. He presented a "state of the union" summary of national A.S.M. affairs in an after-dinner talk, and then presented the technical lecture, "Recent Developments in Alloy Constructional Steels".

Newest Steel Developments Outlined for New Haven

Reported by Glenn F. Whiteley
Heppenstall Co.

"New Developments In Steel", were discussed by R. F. Miller, assistant to vice-president, department of research and technology, U. S. Steel Corp., at the March meeting of the New Haven Chapter.

Dr. Miller pointed out that our steel capacity of 117 million tons this year represented an increase of approximately 50% over the last 20 years, and the per capita consumption more than doubled in that time.

Most of the ore to make this steel came from the Lake Superior district where high-grade ores are now being depleted. Considerable research and development work are being done to separate and concentrate the Taconite ores, which are plentiful, to make up for this depletion. High-grade ore deposits in Quebec, Labrador, and Venezuela are also being developed.

The speaker discussed the greatly increased size of the modern blast furnace. These furnaces are highly mechanized, are carbon lined for longer life, have increased top pressure, and produce more iron with less coke than ever before.

R. F. Miller

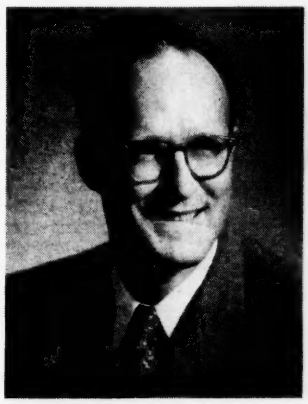
Dr. Miller described induction stirring in electric furnaces, the turbo-hearth process and other furnace developments. He talked briefly about developments in rare earth additions, boron steels, continuous casting, hot extrusion using glass as a lubricant, and stainless and heat resisting steels.

The meeting was concluded by the showing of a new U. S. Steel Corp. sound and color motion picture film of the Orinoco Mining Co.'s development at Cerro Bolivar, Venezuela.

Carl Gerlach Named A.S.M. Staff Engineer

The appointment of Carl H. Gerlach as Staff Engineer on the A.S.M headquarters staff has been announced by W. H. Eisenman, national secretary of the Society.

Mr. Gerlach brings to A.S.M. a background of 13 years of design, product development and manufacturing experience in the mechanical and metalworking industries. His experience includes positions as product development engineer at the Clark Controller Co., project engineer at Jack and Heintz, and other design and inspection positions.


Carl Gerlach

Mr. Gerlach was graduated from Stanford University in mechanical engineering. As a naval Lieutenant, he was in charge of certain development projects at the Research and Development Center in Norfolk, Va., from 1942 to 1946.

The new position of Staff Engineer, with Mr. Gerlach active in the position, will enhance the Society's ability to serve its many members in design and production work. More than 10,000 A.S.M. members are engaged in such nonmetallurgical activities.

IMPORTANT MEETINGS *for June*

June 15-18—American Electroplaters' Society. 40th Annual Electroplaters Convention. Benjamin Franklin Hotel, Philadelphia. (D. Gardner Foulke, Executive Secretary, A.E.S., 473 York Rd., Jenkintown, Pa.)

June 15-19—Exposition of Basic Materials for Industry. Grand Central Palace, New York City. (Don G. Mitchell, Chairman of the Board of Sponsors, Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N. Y.)

June 16-19—American Welding Society. National Spring Technical Meeting, and Welding and Allied Industry Exposition. Shamrock Hotel, Houston, Texas. (J. G. Magrath, Executive Secretary, A.W.S., 33 West 39th St., New York City).

June 20-24—American Society of Mechanical Engineers. Semi-Annual Meeting. William Penn Hotel, Pittsburgh, Pa. (C. E. Davies, Secretary, A.S.M.E., 29 West 39th St., New York 18, N. Y.)

June 29-July 3 — American Society for Testing Materials. Annual Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J. (R. J. Painter, Executive Secretary, A.S.T.M., 1916 Race St., Philadelphia 3, Pa.)

June 29-July 3—American Institute of Electrical Engineers. Summer General Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J. (H. H. Henline, Secretary, A.I.E.E., 33 West 39th St., New York 18, N. Y.)

Underbead Cracking in Welds Discussed

Reported by Andrew N. Eshman
Engineering Laboratory
North American Aviation, Inc.

The Columbus Chapter recently heard H. Maurice Banta, supervising engineer, ferrous metals research, Battelle Memorial Institute, deliver a talk on "Welding Problems as Related to Metallurgy". Actually, Mr. Banta stated, a study of welding problems might be regarded as a study of high-speed metallurgy because of the rapidity of the temperture cycle changes encountered during welding.

Mr. Banta stated that in welding two steels of identical chemical analysis, one might exhibit underbead cracking whereas the other might not. He presented an example of two AISI 4130 steels of identical chemistry. One steel had evidenced underbead cracking when welded, the other had not. To determine the amount of carbide solubility of each steel during the short cycle of heating and cooling encountered during welding, dilation cooling curves were plotted. The steel that did not crack had much greater carbide solubility than did the other. A study of the microstructure of the two steels revealed a difference in carbide dispersion. The steel that had good welding characteristics had more finely dispersed carbides.

Underbead cracking can be prevented in several ways. Proper heat treatment can affect carbide solubility and reduce banding, and steels that have been homogenized, then annealed or normalized, have less tendency toward underbead cracking.

If the chemistry of the steel contains small additions of aluminum, the ductility of the weld zone is improved. Aluminum is conducive to carbide forming and appreciably reduces the air hardenability of the steel.

Proper preheat and postheat processing are very effective in preventing underbead cracking.

In conjunction with his talk, Mr. Banta showed numerous slides, one of which depicted the equipment setup used in making the dilation cooling curves for the various steels.

Cites Challenge in Aircraft Designing

Reported by A. S. Vince
Royal Canadian Mint

Wing Commander H. R. Foottit, director of development "A", R.C.A.F., spoke before the Ottawa Valley Chapter on "Recent Developments in Aircraft Engineering" recently.

Even in the early days of aircraft engineering, planes were required to operate at the limit of their performance capabilities. However, as the planes developed, so did the demands upon them and it was realized that special types of planes would have to be built for specific purposes.

Thus, planes are designed to operate within certain paramenters which depend on many factors—position of airfields, climate, type of country, speed, altitude, range, rate of climb, etc. New developments, such as radar or jet engines, introduce new conceptions entailing almost complete redesign of military aircraft.

At present there are several transonic fighters (planes which when dived at full power can exceed the speed of sound), but no operational machines which can exceed and maintain supersonic speeds in level flight. However, designers believe that this is possible by the use of after burners, ram jets or rocket motors, and are already worried by what has been termed the "thermal barrier" or increase in temperatures caused by air friction at high speed. It is considered, for example, that aluminum alloys will be useless as skin material because of their rapid drop in properties at higher temperatures. Also, many types of equipment may have to be redesigned or installed in refrigerated compartments.

Cdr. Foottit explained that it has long been realized that many of the complexities of modern aircraft are due to the limitations of the body of the pilot who flies the plane. Pressure, atmosphere, temperature and sight have already to be supplemented in high-speed, high-altitude aircraft, which means added complexity and weight. Pilotless aircraft, guided missiles and similar craft provide attractive alternatives, but, unfortunately, at the present time they are still only in the process of development.

Thus, with mounting problems and complexities, and the necessary background of development and research, the cost of each aircraft increases, and the decision has to be made whether to build a large number of relatively simple aircraft or a smaller number of more complex ones for the same cost.

At the conclusion of the talk, two excellent films were shown on the development of modern high-speed aircraft in Canada and Great Britain.

Expand Heat Treating Plant

L. A. Lindberg, president of the Lindberg Steel Treating Co. has announced a $2-million expansion program which will include a new 100,000 sq. ft. plant now under construction on a 6-acre tract of land in Melrose Park, Chicago.

The one-story structure, which will double the company's heat treating capacity to more than 50,000,000 lb. annually, will house some 200 heat treating furnaces, including more than $1-million worth of new equipment.

Course on Characteristics Of Engineering Materials Is Popular in San Diego

Reported by Joseph C. Thompson
U. S. Navy Electronics Laboratory

The San Diego Chapter recently completed its 1953 series of eight educational metal conferences. These meetings were held in the auditorium of the Hoover High School with the cooperation of the San Diego City Schools.

This is the third consecutive year these meetings have been held. They are becoming an annual tradition with the Chapter and workers of the San Diego area national defense metals industries.

This year's total attendance was well over 3000. The actual registered attendance was 2630 or an average attendance of 329 for each of the eight consecutive weekly meetings.

The growing popularity of the meetings was evidenced by the fact that the greatest attendance, 374, was registered at the last of the eight meetings.

The first meeting of the series was opened by National Secretary William H. Eisenman, with the subject: "What Is Metal?" The other lectures were:

"Why Alloy Metals?", by Don D'Amico, manager, stainless steel division, Jos. T. Ryerson and Son, Inc., Los Angeles.

"What Happens To Metal When Worked?", by Fred Robbins, president, Sierra Drawn Steel Co., Los Angeles.

"Why Heat Treat Steels?", by Howard Farmer, Jr., chief metallurgist, Dresser Operations, Inc., Whittier, Calif.

"What Is Machinability?", by Charles F. Derbyshire, staff design engineer, Rohr Aircraft, Chula Vista, Calif.

"Cemented Carbides — Why and How?", by R. J. Mack, manager, Pacific District Carboloy Division, General Electric Co., Los Angeles.

"Why Alloy Aluminum and Magnesium?", Orlo Brown, Jr., chief metallurgist, Fletcher Aviation Corp., Pasadena, Calif.

"What Are the Problems of Titanium?", by Thomas E. Perry, contact metallurgist, Republic Steel Co., Massillon, Ohio.

Employees and personnel of the Naval Air Station, the Naval Base, Naval Training Center, Electronics Laboratory and ship-based men accounted for 49% of the total attendance; 44% were from local aircraft factories; 7% from miscellaneous industries.

Part of the Average Crowd of 329 Persons Who Attended One of the Eight Lectures Sponsored by the San Diego Chapter. Total registration for the course topped 3000

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Claudia Carter, Ardeth Holmes, Norma King and Members of the Translation Group

A
GENERAL METALLURGICAL

93-A. A Survey of World Trends in Some Non-Ferrous Metals. G. J. Brittingham. *Australasian Engineer,* Jan. 7, 1953, p. 73-77; disc., p. 77-79.

World resources and production rates of nonferrous metals. Need to conserve stocks by developing more efficient production methods for new metal, careful control and recovery of scrap metal, and greater efficiency in the use of metals generally. Tables. (A4)

94-A. How the Production Engineer Can Be Helped by the Metallurgist. J. D. Jevons. *Sheet Metal Industries,* v. 30, Feb. 1953, p. 105-113, 134; Mar. 1953, p. 207-212.

Designing to facilitate production, choice of manufacturing methods, stress raisers, cracks, microstructure, machinability, grinding, deduction of competitors' methods, how the metallurgical microscope can help the production engineer, and unusual problems. Photographs and micrographs. (A6)

95-A. British Columbia's Steel Industry, Past, Present, and Future. G. R. Heffernan. *Canadian Mining and Metallurgical Bulletin,* v. 46, Mar. 1953, p. 169-172.

Brief history of iron and steel in British Columbia; present operations of Western Canada Steel, Ltd.; review of iron ore resources and iron and steel markets; and a projection of what the future might hold for the industry.
(A4, B10, D general, ST)

96-A. Water Symposium. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 68-82; disc. p. 82-83.

Includes "Liquid Waste Treatment", C. S. Cassels; "Lukens Water Purification System", N. H. Jensen; "Current Practice in Water Pollution Abatement", B. P. Martinez; and "Operating Experience With Waste Water Treatment Plants", F. C. Schoen. (A8)

97-A. Recovery of Tin From Scrap Tinplate. A. J. Krombholz. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 98-105; disc. p. 105-106.

Alkaline detinning and tin recovery process. Equipment used for handling and processing scrap. Photographs. (A8, Sn)

98-A. Comparative Investment Costs for Different Steelmaking Processes. Charles F. Ramseyer. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 122-134.

A study of the relative capital investments required to make steel by different processes. Tables.
(A4, D general, ST)

99-A. Modern Developments in the Spanish Iron and Steel Industry. *Mining Journal,* v. 240, Mar. 13, 1953, p. 302-303.

Condensation from *Monthly Statistical Bulletin,* v. 28, no. 1. Brief history of Spain's iron and steel industry, as well as a summary of her home and colonial iron ore deposits. Describes proposed Avilés plant. (A4, B10, Fe, ST)

100-A. Analysis of Western Metalworking. *Western Metals,* v. 11, Mar. 1953, p. 65-76.

Growth of Western metal industries including size and growth by state and industry; defense work plus consumer production; and factors for further expansion. Photographs and graphs. (A4)

101-A. Western Primary Metals Production Races to Keep Pace With Demand. *Western Metals,* v. 11, Mar. 1953, p. 77-81.

Increased use of steel, Al, Cu, Zr, Ti, and Mg. Graphs and photographs. (A4, ST, Al, Cu, Zr, Ti, Mg)

102-A. Outlook in Principal Consuming Industries for Porcelain Enameled Products. R. C. Myers. *Finish,* v. 10, Apr. 1953, p. 37, 66.

Includes short-range outlook for '53 and significant longer range factors. (A4, T general)

103-A. Five Year Review of Tin. *Metal Bulletin,* Mar. 13, 1953, p. 11-13.

Extracts from "Tin and the Tin Study Group, 1948-52", published by International Tin Study Group, The Hague, Netherlands. Production, consumption, price, and stocks. Tables. (A4, Sn)

104-A. New Metallurgical Research Center in France. *Metal Progress,* v. 63, Mar. 1953, p. 83-86.

The new center of the Research Institute for Ferrous Metallurgy (IRSID), which is to conduct technical and scientific research on all types of ferrous metallurgy. (A9)

105-A. Current Russian Metallurgical Texts-II. Carl A. Zapffe. *Metal Progress,* v. 63, Mar. 1953, p. 91-95.

Reviews 12 official publications recently issued by the Governmental Scientific-Technical Publishing House in Moscow. (A general)

106-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 19, Dec. 1952, p. 519-526; v. 20, Jan. 1953, p. 35-42; Feb. 1953, p. 71-78; Mar. 1953, p. 123-130.

These installments define "Elastic Strain" to "Emerald Nickel", "Emery" to "Etchant", "Etchant" to "Ferrite Ghost", and "Ferrites to Folding Test". (To be continued.)
(A10)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

107-A. Open Hearth Dust Control. S. Vajda and G. M. Dreher. *Proceedings of the 45th Annual Meeting,* Air Pollution and Smoke Prevention Association of America, Inc., 1952, p. 26-32; disc., p. 36, 39-40.

Test using sonic units with types "D" and "W" Rotoclones, Multiclone, Trion precipitator, type "N" Rotoclone, and Impingo Pebble filter.
(A5, D2)

108-A. A Foundry Equipment Manufacturer's Reaction to Air Pollution Ordinances. John M. Kane. *Proceedings of the 45th Annual Meeting,* Air Pollution and Smoke Prevention Association of America, Inc., 1952, p. 45-46; disc., p. 46-47.

Control equipment in many ferrous foundries. (A5, E general)

109-A. The New Patent Law of 1953. H. A. Toulmin, Jr. *Product Engineering,* v. 24, Apr. 1953, p. 186-189.

Explains meanings of changes in the patent law. (A6)

110-A. (Book) **Mechanical World Year Book. 1953.,** v. 66. 268 pagese. Emmott & Co., Ltd., 21 Bedford St., London, W.C.2, England. 3/6 net.

Contains mathematical tables, classified buyers' directory, and a new section on spring design.
(A general, Q general)

111-A. (Book) **Men of Steel.** Arthur Pugh. 624 pages. Iron and Steel Trades Confederation, London, England. 21s.

Development of trade unionism and the progress of human relations in the industry. Tells what the unions did, why they did it, and what followed. (A6, ST)

112-A. (Book) **Methods for Treating Metal-Finishing Wastes.** 72 pages. Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati, 2. $2.00.

Techniques, reactions, and design considerations in methods of handling industrial wastes. Advantages and weaknesses for each method.
(A8)

113-A. (Book) **Nomenclature.** 20 pages, Apr. 1952. Aluminum Assoc., 420 Lexington Ave., New York 17, N. Y.

A glossary of terms for Al products. Includes sheet, plate, extrusions, and tubular products.
(A10, Al)

114-A. (Book.) **Transactions of the American Society for Metals.** v. 45. Ray T. Bayless, editor. 1152 pages. 1953. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $10.00.

Includes 50 papers, presented at the Thirty-Fourth Annual Convention of the Society, held in Philadelphia, Oct. 18-24, 1952, and at Western Metal Congress in Los Angeles, Mar. 23-27, 1953. Some were abstracted as preprints; others are abstracted in this issue. (A general)

115-A. (Book—French.) **(Metallurgy.) Metallurgie. Ed. 65.** R. Cazaud. 372 pages. 1953. Dunod, 92 Rue Bonaparte, Paris 6, France. 450 fr.

Condensed pocketbook of metallurgical information covers some 30 metals, briefly giving their properties, basic qualities, and metallurgical characteristics. Separate sections are devoted to metal corrosion, heat treatment, and testing. Data tables and common formulas are included. (A general)

116-A. (Book—Russian.) **Notes on the History of the Metallurgy of the Light Metals.** A. I. Belyaev. 142 pages. 1950. Governmental Scientfic-Technical Publishing House, Moscow, U.S.S.R.

Histories of Al, Mg, Be, and Li from a Russian point of view. (A2, Al, Mg, Be, Li)

117-A. (Book—Russian.) **D. K. Chernov** (Tschernoff). B. E. Volovik. 1950. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Historical account of the work done by D. K. Tschernoff in the field of metallurgy. (A2)

B

RAW MATERIALS AND ORE PREPARATION

65-B. A Simple Formula for Evaluating Iron Ores. Francis H. Crockard. *Blast Furnace and Steel Plant,* v. 41, Mar. 1953, p. 295-301.

Formula gives values based on Fe content alone that is useful in broad general terms. (B11, Fe)

66-B. Heat Hardening of Pellets Made From Taconite Concentrates. G. V. Woody. *Blast Furnace and Steel Plant,* v. 41, Mar. 1953, p. 314-317.

Type of equipment in operation at pilot plant. Diagrams. (B16, Fe)

67-B. Sampling and Testing of Sinter. R. L. Stephenson and D. J. Carney. *Mining Engineering,* v. 5, Mar. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 196, 1953, p. 309-311.

Describes sampling technique developed for procuring a sample of sinter representative of entire depth of sintering bed. Additional data were obtained to indicate that the tumbler test is a suitable means of measuring sinter strength. Photographs and graphs. (B11, B16)

68-B. The Magnetic Reflux Classifier. Lawrence A. Roe. *Mining Engineering,* v. 5, Mar. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 196, 1953, p. 312-315.

Apparatus which utilizes combined effects of magnetic fields and a hindered settling classifier is used to determine quantity and quality of middlings in fine-sized magnetite concentrates. Results are given for processing a typical taconite ore. Sketch of apparatus. Tables. (B14, Fe)

69-B. (French.) **Conducting and Controlling the Operation of Steel Mill Gas Generators.** P. Devilder. *La Métallurgie et la Construction Mécanique,* v. 85, Jan. 1953, p. 47, 49, 51, 53.

General discussion. Includes schematic drawings (B18)

70-B. New Ways to Metals. *Fortune,* v. 47, Apr. 1953, p. 152-157, 208, 211-212, 214, 216.

New ore dressing and extractive processes. (B general, C general)

71-B. Low Grade Ores. J. D. Sullivan and S. F. Ravitz. *Machinery Lloyd* (Overseas Ed.), v. 25, Mar. 28, 1953, p. 71, 73, 75, 77-79.

Review of some changes in economically usable grades of ores and of some outstanding recent technical developments for employing low-grade ores, including byproduct utilization. Considers Fe, Al, Mn, and W ores. (B general, Fe, Al, Mn, W)

72-B. More Ferro-Alloys for Hungry Furnaces. *Steel Horizons,* v. 15, no. 1, 1953, p. 24-25.

Production expected from new plant in Marietta, Ohio. Photographs. (B22, Fe)

73-B. Processes for Beneficiating Great Gossan Lead Ores, Carroll County, Va. James S. Browning and Clinton B. Clevenger. *U. S. Bureau of Mines,* Report of Investigations 4945, Feb. 1953, 14 pages.

Technical feasibility of recovering the associated Cu, Pb, and Zn from pyrrhotite ore. Small-scale preliminary studies. (B14, Pb, Cu, Zn)

74-B. Hermada Antimony Deposit, Elmore County, Idaho. Constantine C. Popoff. *U. S. Bureau of Mines,* Report of Investigations 4950, Feb. 1953, 21 pages.

Physical features and geology. Field work done by Bureau of Mines emphasizing ore flotation and tailing tests. (B10, B14, Sb)

75-B. Ore-Dressing Tests of Aroostook County, Maine, Manganese Ores. Frank D. Lamb, W. E. Warnke, and D. A. Woodard. *U. S. Bureau of Mines,* Report of Investigations 4951, Feb. 1953, 10 pages.

Gravity concentration, roasting, magnetic separation, and flotation. Tabulated data. (B14, Mn)

76-B. Preliminary Tests of Nevada Oxidized Copper Ores. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4952, Feb. 1953, 6 pages.

Tests confined for the most part to laboratory-scale acid leaching for Cu extraction. (B14, Cu)

77-B. (German.) **Suggestions for Increasing Efficiency of Industrial Coking Furnaces.** Franz Trefny. *Brennstoff-Chemie,* v. 34, Feb. 1953, p. 45-51.

Measures include increasing coal charge and improving quality of degassing product. Charts. 70 ref. (B18)

78-B. (German.) **Recent Work on Preparation of Improved Blast Furnace Coke.** C. Abramski. *Brennstoff-Chemie,* v. 34, Feb. 1953, p. 51-55.

Various grinding and selection methods used in German industry. (B18, D1)

79-B. (Book.) **Minerals—a Key to Soviet Power.** Demitri B. Shimkin. 452 pages. Harvard University Press, Cambridge 38, Mass. $8.

Systematic survey of mineral resources and their production and consumption by the Soviets. Deals with ferrous and nonferrous metals, gold, fuels, and nonmetallics. Problems of adequacy of Soviet production and reserves as related to economic growth and potentialities for self-sufficiency to 1970. (B10)

80-B. (Book—Russian.) **Hydrometallurgy.** E. N. Plaksin and D. M. Iuktanov. 732 pages. 1949. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Official U.S.S.R. summary of ore dressing and hydrometallurgical field. Includes detailed flow sheets. (B14)

C

NONFERROUS EXTRACTION AND REFINING

48-C. The Control of Quality in the Production of Brass Ingots and Billets. Maurice Cook and C. L. M. Cowley. *Journal of the Institute of Metals,* v. 81, Mar. 1953, p. 341-350.

Application of basic principles and practical knowledge to eliminate or minimize the incidence of defects. Tables. (C5, S12, Cu)

49-C. The Control of Quality in Melting and Casting Copper and High-Conductivity Copper-Base Alloys. J. Sykes. *Journal of the Institute of Metals,* v. 81, Mar. 1953, p. 351-363.

Selection of raw materials and their blending into suitable furnace charges. Fire-refining process for the production of high-conductivity Cu wire-bars. Methods used in the production of phosphorus-deoxidized Cu, TeCu, CaCu, and AgCu. Diagrams and tables. 13 ref. (C21, Cu)

50-C. The Control of Quality in the Casting of Zinc and Zinc Alloy Rolling Slabs and Extrusion Billets. C. W. Roberts and B. Walters. *Journal of the Institute of Metals,* v. 81, Mar. 1953, p. 365-375.

Various techniques and procedures adopted commercially. Importance of control of chemical composition both in raw materials and in the final products. Tables. (C5, S12, Zn)

51-C. Further Development of the Sterling Process. W. M. Peirce. *Mining Congress Journal,* v. 39, Mar. 1953, p. 46-49, 78.

Method for smelting Zn ores using heat generated by an electric arc to carry on the reduction. Possibility of commercial application. Photographs. (C21, Zn)

52-C. (French.) **Continuous Casting in the Foundry.** J. Pascal. *La Métallurgie et la Construction Mécanique,* v. 85, Jan. 1953, p. 21, 23, 25.

General discussion. Includes charts. (C5, D9)

53-C. Arc Melts of Titanium-Rich Alloys. G. Welter, A. Choquet, and F. Claisse. *Canadian Mining Journal,* v. 74, Mar. 1953, p. 59-69.

Melting and testing apparatus and methods. Findings are given with respect to metallography and mechanical properties. Photographs, micrographs, graphs, tables, and diagrams. 23 ref. (C21, M27, Q general, Ti)

54-C. A Brief Outline of the Mount Isa Copper Smelter. R. V. Anderson. *Mining Journal,* v. 240, Mar. 13, 1953, p. 300-301.

Details of several procedures used in smelting operations. Charge make-up, roasting, reverberatory furnace smelting, preheating primary air, refining, and casting. (C21, Cu)

55-C. Van Stone. American Smelting's Newest Zinc Operation. *Mining World,* v. 15, Apr. 1953, p. 26-31, 68-69.

Development and design features of the mill. Photographs. (C21, Zn).

56-C. Consumable-Electrode Arc Melting of Zirconium Metal. W. W. Stephens, H. L. Gilbert, and R. A. Beall. *Transactions of the American Society for Metals,* v. 45, 1953, p. 862-871.

Process, equipment, and furnace which offer practical means for producing large ingots of refractory metals and alloys. The power requirement is less than 0.5 kw-hr. per

pound. Photographs and diagrams. 7 ref. (C21, Zr, EG-d)

57-C. (Italian.) Contribution to the Knowledge of Aluminium Electrolysis. A. Vajna. *La Metallurgia Italiana,* v. 44, Dec. 1952, p. 585, 587-597.

Presents experimental proof of the primary separation of Al at the cathode and O_2 at the anode in the electrolysis of cryolite and Al_2O_3 molten mixtures. The dispersed metallic phase at the cathode and the gaseous phase formed in the proximity of the anode are studied by new photographic method. (C23, Al)

58-C. The Caustic Electrolytic-Zinc Process. Charles T. Barock, R. V. Hilliard, and R. S. Lang. *Electrochemical Society Journal,* v. 100, Apr. 1953, p. 165-172.

Results of work on this process indicate that it is technologically feasible for many types of oxidized Zn ores, drosses, and calcines. Tables and graphs. 18 ref. (C23, Zn)

59-C. Vacuum Melting Lengthens Fatigue Life, Improves Impact Properties. James H. Moore. *Iron Age,* v. 171, Apr. 2, 1953, p. 154-156.

Advantages of using vacuum furnaces for melting nonferrous metals such as beryllium copper. (C25, Q6, Q7, Cu)

60-C. Asarco Continuous-Cast Bearing Bronzes. J. S. Smart Jr., and Paul J. Kranz. *Mechanical Engineering,* v. 75, Apr. 1953, p. 287-290.

Continuous-casting of standard bronze compositions results in beneficial increases in mechanical properties. Tables, diagrams, and micrographs. (C5, Q general, Cu)

61-C. An Arc Furnace for Melting Refractory Metals. J. W. Pugh, R. L. Hadley, and R. W. Henning. *Metal Progress,* v. 63, Mar. 1953, p. 70-71.

Describes and diagrams the furnace, which used an inert atmosphere and a water-cooled metal crucible. (C21, SG-h)

62-C. Aspects of Continuous Casting of Non-Ferrous Metals. Part III. Factors Controlling Permissible Speed of Casting. Part IV. Porosity and Varying Influential Factors. Parts V and VI. Surface Appearance. B. H. C. Waters. *Metal Treatment and Drop Forging,* v. 19, Dec. 1952, p. 526-530, 532; v. 20, Jan. 1953, p. 3-10, 20-22; Feb. 1953, p. 79-83; Mar. 1953, p. 103-109.

Concluding installment of Part III reviews properties and influence of various lubricants used as mold dressings. Susceptibility of an alloy to hot tearing during continuous casting and factors controlling this. Part IV: Some physical properties of continuously cast ingots at varying speeds. Formation and cause of porosity, and influence of variation in casting and temperature rate. Part V correlates interriple distance and linear casting speeds. Part VI: Factors causing ripple formation on surface of continuously cast ingots. Reviews theories to explain ripple formation. 43 ref. (C5, E25, EG-a)

63-C. Zirconium. Metals' "Sleeping Beauty". *Midwest Engineer,* v. 5, Mar. 1953, p. 11-12, 20.

Difficulties encountered in production of Zr. (C general, Zr)

64-C. Recovery of Bismuth From Refinery By-Products. C. C. Downie. *Mining Journal,* v. 240, Mar. 27, 1953, p. 362-363.

Various refining processes including oxidation, chlorination, and electro-refining. (C4, C23, Bi)

65-C. (Book—Russian.) Calculations for the Metallurgy of Heavy Nonferrous Alloys. F. M. Loskutov and A. A. Saidler. 384 pages. 1948. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Exemplary calculations are explained for various processes in metallurgy of Pb, Zn, Cu, Ni, and Sn. Many calculations are accompanied by detailed considerations of stepwise unit processes and heat balance. (C general, Pb, Zn, Cu, Ni, Sn)

66-C. (Book—Russian.) The Metallurgy of Zinc. F. M. Loskutov. 355 pages. 1945. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Pyrometallurgy, hydrometallurgy, and electroplating of Zn. Previously abstracted from the German edition. See item 137-C, 1951. (C 21, B general, L17, Zn)

D

FERROUS REDUCTION AND REFINING

92-D. The Use of Gaseous Oxygen in Electric Steel Making. R. B. Halsey. *Australasian Engineer,* Jan. 7, 1953, p. 66-69.

Development of oxygen blowing for the refining of electric steel. Increased production and technological advantages. Photographs. 13 ref. (D5, SS)

93-D. High Top-Pressure Blast-Furnace Operation. I. Lockerbie. *Engineering,* v. 175, Feb. 27, 1953, p. 267-268.

Compares performance of two blast furnaces with respect to coke used per week, CO:CO_2 ratio, output, slag volume, and top pressure. (D1, Fe)

94-D. Ironmaking. Part I. A Review of Progress in the Process, 1939-1952. Part II. Energy Balance and Efficiency of the B. F. Process. John Taylor. *Iron & Steel,* v. 26, Feb. 1953, p. 39-43; Mar. 1953, p. 87-90.

Present knowledge of some major aspects of ironmaking processes with particular reference to progress made since 1939. Part II: Theories of blast furnace process, and determination of efficiency. 75 ref. (D1, Fe)

95-D. Effects of Basic Oxides Upon the Desulfurization in the Blast Furnace. Parts I and II. B. Weilandt, H. Maetz, and W. Oelsen. Henry Brutcher Translations 2950 and 2951. 23 and 17 pages.

Previously abstracted from *Archiv für das Eisenhüttenwesen.* See item 303-D, 1952. (D1, Fe)

96-D. Continuous Casting of Steel by the Junghans Process. K. G. Speith and A. Bungeroth. Henry Brutcher Translation 2970, 30 pages.

Previously abstracted from *Stahl und Eisen.* See item 325-D, 1952. (D9, ST)

97-D. New Oxygen Steel-Melting Practice Developed in Austria. (The LD Process). Henry Brutcher Translation 2996, 2 pages. (From *Metallurgie und Giessereitechnik,* v. 2, no. 5, 1952, p. 173.)

Process in which high-purity O_2 is blown through an air-cooled nozzle onto metal in converter, imparting a circulatory motion to the bath. Data on steel types, scrap charges, slag volume, dust production, and blowing time. (D3, Fe)

98-D. (French.) Controlling Apparatuses of Blast Furnaces. Paul Thierry. *La Métallurgie et la Construction Mécanique,* v. 84, Dec. 1952, p. 919, 921.

A brief study of controlling apparatus necessary for the efficient operation of a blast furnace. (D1)

99-D. (French.) Pressure and Flow of the Blast in Blast Furnaces. Paul Thierry. *La Métallurgie et la Construction Mécanique,* v. 85, Jan. 1953, p. 15-16, 19.

Factors affecting pressure of the blast. (D1)

100-D. Electrolytic Process With Promise. Erich Konrad. *Chemical Engineering,* v. 60, Apr. 1953, p. 189-192.

Process which produces pure, dense, ductile iron sheets directly from $FeCl_2$ solution by means of graphite anodes and stainless steel cathodes. (D8, Fe)

101-D. Segregation. Major Cause of Flakes in Alloy Gun Steels. J. B. Gero and A. R. Troiano. *Iron Age,* v. 171, Mar. 26, 1953, p. 133-137.

Investigation in which SAE 4340 blooms and forgings were tested shows that flaking is probably a direct result of dendritic segregation. Graphs. 22 ref. (D9, N12, AY)

102-D. Temperature Distribution in Carbon Hearths. R. D. Westbrook. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 141-144.

Determination of optimum hearth thicknesses for blast furnaces and effective cooling tehcniques. Diagrams. (D1)

103-D. Activities of Constituents of Iron and Steelmaking Slags. Part I. Iron Oxide. E. T. Turkdogan and J. Pearson. *Journal of the Iron and Steel Institute,* v. 173, Mar. 1953, p. 217-223.

Shows that for a given iron oxide concentration, small proportions of silica increase the activity of FeO and larger proportions decrease it. Graphs and tables. 18 ref. (D general, B21, Fe)

104-D. Don't Write Off the Blast Furnace. Charles E. Agnew. *Steel,* v. 132, Mar. 16, 1953, p. 110, 113, 116, 118, 121, 124, 128, 131, 134; Mar. 23, 1953, p. 86, 88, 91, 92; Mar. 30, 1953, p. 92, 94, 97-98, 100, 102, 104, 107; Apr. 6, 1953, p. 146, 148, 151-152, 155-158.

Part I: Development and advantages of present designs. Part II recommends changes to permit use of O_2-enriched blast and discusses principles, theories, and specifications. Part III questions use of O_2-enriched blast for a hanging furnace. Shows that CO_2 in blast is detrimental. Part IV: Success of O_2-enrichment is affected by variations in raw material, thermal requirements, and operating practice. (D1, ST)

105-D. Distribution of Oxygen Between Metal and Slag in the Basic Open-Hearth Furnace. B. V. Stark and E. V. Chelishchev. Henry Brutcher Translation 2878, 13 pages. (From *Trudy Moskovskogo Instituti Stali im. I. V. Stalina, Symposium XXX "Structure and Properties of Steel",* Metallurgizdat, Moscow, 1951, p. 70-84.)

Experimental data from 21 basic openhearth heats. (D2, Fe)

106-D. Performance Data on Electric Arc Furnaces With Shell Diameters of Over 12 Feet. F. Badenheuer. Henry Brutcher Translation 2940, 18 pages.

Previously abstracted from *Stahl und Eisen.* See item 210-D, 1950. (D5, ST)

107-D. Refining of High-Chromium Steel Heats in the Arc Furnace With Pure Oxygen. R. Fischer. Henry Brutcher Translation 2947, 30 pages.

Previously abstracted from *Stahl und Eisen.* See item 60-D, 1950. (D5, B22, AY)

108-D. (German.) Efficiency of Blast Furnaces and Development of the Large Blast Furnace. Eduard Senfter. *Stahl und Eisen,* v. 72, Dec. 18, 1952, p. 1633-1642.

Design and use of small and large blast furnaces; coke consumption per ton of iron ore as a standard of measurement; coke charge and iron yield by the Möller process; and capacity data for large blast furnaces. Tables and graphs. 8 ref. (D1, Fe)

109-D. (German.) **Blowing of Bessemer Pig Iron With the Open Jet.** Carl V. Schwarz. *Stahl und Eisen,* v. 72, Dec. 18, 1952, p. 1642-1652.

Cooling with mill scale is effective and results in a good yield of iron from the ore. Use of O_2 jet is as efficient as blowing through tubes immersed in a bath. Graphs and tables. 10 ref. (D3, Fe)

110-D. (German.) **Computing Basic Costs in the Iron Industry with Special Regard for Blast Furnace Installations.** Gottfried Prieur and Otto-Max Petersen. *Stahl und Eisen,* v. 72, Dec. 18, 1952, p. 1665-1671.

Minimum requirements, comparative presentation for blast-furnace works, sources of error, and determination of monthly requirements. Tables. (D1, Fe)

111-D. (German.) **On the Refining of Bessemer Pig Iron With Pure Oxygen.** Friedrich Alfred Springorum, Karl Georg Speith, and Willy Oelsen. *Stahl und Eisen,* v. 73, Jan. 1, 1953, p. 6-22.

Experimental procedure; peculiarities of the reaction; results of adding scrap and ore; N_2 content of the steel; slag formation; behavior of P and Mn; O_2 content of the bath; and economic considerations. Graphs and tables. 59 ref. (D3, CN)

112-D. The Casting of Ingots for Seamless Tube Making. G. Bowman. *Engineering,* v. 175, Feb. 27, 1953, p. 286-287; Mar. 20, 1953, p. 381-338.

Teeming speed, cracking, cavitation, crusting, and porosity. (D9, F26, CI)

113-D. Successes and Failures in Sponge Iron Manufacture. *Metal Bulletin,* Mar. 17, 1953, p. 9-12.

Methods for preparation. (D8, Fe)

114-D. Sponge Iron. P. E. Cavanagh. *Metal Progress,* v. 63, Mar. 1953, p. 67-69.

Production in Mexico and Sweden, increasing demand, and cost. (D8, Fe)

115-D. (Swedish.) **Reaction Products Formed at Contact Surface Between Liquid Steel and Fireclay Brick.** T. Wahlberg and L. Fredholm. *Jernkontorets Annaler,* v. 137, no. 1, 1953, p. 1-25.

Analytic and microscopic examinations on isolated reaction products. (D general, ST)

116-D. (Book—Russian.) **Electric Melting Furnaces for Ferrous Metallurgy.** N. V. Okorokov. 563 pages. 1950. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Covers variations of arc and induction furnaces. Tables and diagrams describe details ranging from mathematical theory for electrical characteristics to information on furnace construction. (D5, ST)

117-D. (Book—Russian.) **Hydrogen and Nitrogen in Steels.** A. N. Morozov. 222 pages. 1950. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Coverage is principally for wrought steel, and considers only thermal treatments. Includes data on gas analyses for the acid open-hearth and flake formation. (D general, ST)

NATIONAL METAL CONGRESS
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E

FOUNDRY

165-E. How Foundrymen Can Get the Most From Naturally Bonded Sands. Clyde A. Sanders. *American Foundryman,* v. 23, Mar. 1953, p. 36-40.

Advantages and disadvantages of natural molding sands and how to use them properly. Photographs. (E18)

166-E. How to Standardize and Set Up Multiple Molding in a Malleable Shop. Joseph G. Kropka. *American Foundryman,* v. 23, Mar. 1953, p. 44-49.

Methods of sand handling, molding, pouring, and shakeout operations. Tests and equipment used. Need for standardizing flasks, machines, and molding procedure to meet specifications and production requirements. Recommends constant checking to insure quality of products. Photographs. (E19, CI)

167-E. Basic Cupola Operation. Dephosphorization of Iron. Jack E. Bolt. *American Foundryman,* v. 23, Mar. 1953, p. 50-53.

Dephosphorization can be accomplished in basic cupola operation using insulation between shell and basic brick lining and sufficient coke to maintain slag and metal fluidity. Graphs and tables. (E10, CI)

168-E. Practical Foundry Applications of Principles of Ratio Gating. L. L. Lucas. *American Foundryman,* v. 23, Mar. 1953, p. 54-58.

Experiments and actual applications of ratio gating used on several hundred thousand castings of Al-base alloy cooking utensils. Photographs. (E22, Al)

169-E. Foundrymen Can't Know Too Much About Practical Heat Transfer. William S. Pellini. *American Foundryman,* v. 23, Feb. 1953, p. 69-76; Mar. 1953, p. 59-69.

Analogue studies are compared with direct experiment. Rough approximation of freezing times; effect of metal variables on solidification; mold variables; effect of chill size; and dry and green sand effects. Graphs and diagrams. (E25)

170-E. Progress of Spheroidal-Graphite Iron. W. W. Braidwood. *Foundry Trade Journal,* v. 94, Feb. 26, 1953, p. 231-236.

Progress in controlled production of nodular cast iron. Photographs. 14 ref. (E25, CI)

171-E. Surface Defects on Steel Castings. Modes of Occurrence and Means of Prevention. D. V. Atterton. *Iron & Steel,* v. 26, Mar. 1953, p. 93-97.

Dirt spots, inclusions, cold laps, misruns, blowholes, blows, pinholes, metal penetration, burnt-on sand, scabs, buckles, and drops. Graphs and diagrams. 24 ref. (E25, S13, CI)

172-E. The Control of Quality in Melting and Casting Magnesium Alloys for Hot Working. R. G. Wilkinson and S. B. Hirst. *Journal of the Institute of Metals,* v. 81, Mar. 1953, p. 393-400.

Present practices in quality control and inspection in the melting and casting of three principal types of Mg alloys. Tables. (E10, S12, Mg)

173-E. Producing High-Quality Iron Castings in Shell Moulds. Methods Employed by Macmillan Foundries, Ltd., Watford. *Machinery* (London), v. 82, Mar. 6, 1953, p. 419-426.

Investment mixture, pattern materials, method of reinforcing shells, use of shell cores, and pouring procedure. (E16, CI)

174-E. Aluminium Pressure Die-Casting Dies. Their Failure by Surface Cracking. H. J. Sharp. *Metal Industry,* v. 82, Feb. 20, 1953, p. 141-143; Feb. 27, 1953, p. 164-166; Mar. 6, 1953, p. 181-184.

Mechanism of failure and variables including injection speed and pressure; die and metal temperature; die dressings; water cooling; and starting-up procedure. Includes investigations using actual dies. Micrographs, graphs, tables, and diagrams. (E13, Al)

175-E. Production Methods in the Enamelling Shop. H. M. Hibberd. *Sheet Metal Industries,* v. 30, Mar. 1953, p. 233-236.

Controlled procedure for casting and enamelling cast iron. (E11, L27, CI)

176-E. Media for Fluxing, Purifying, Degassing, Desulfurizing, and for Preventing Shrinkage Cavities in Nonferrous Metals, and Iron and Steel Castings. E. Piwowarsky. Henry Brutcher Translation 2897, 15 pages.

Previously abstracted from *Giesserei.* See item 588-E, 1951. (E25)

177-E. Pressure Tightness in Bronze Castings. M. J. Davison. *Canadian Metals,* v. 16, Feb. 1953, p. 32, 34, 36; Mar. 1953, p. 28, 30, 32.

Discusses shrinkage and gas as factors contributing to microporosity. (E25, Cu)

178-E. Calcium Carbide Injection Is New Tool in Gray Iron Metallurgy. Harvey E. Henderson and Philip M. Hulme. *Foundry,* v. 81, Apr. 1953, p. 86-91, 241-248.

How CaC_2 can be used to desulfurize, upgrade, and spheroidize low-tensile-strength iron. Tables, photographs, and diagrams. (E25, CI)

179-E. Zircon and Its Foundry Applications. W. M. Peterson. *Foundry,* v. 81, Apr. 1953, p. 92-95.

Desirable properties of zircon and how to make use of them in the foundry. Photographs. (E25)

180-E. High-Speed Molding is Done Automatically. William G. Gude. *Foundry,* v. 81, Apr. 1953, p. 98-101.

Automatic molding unit in a steel foundry. (E21, CI)

181-E. Induction Melting in a Nonferrous Jobbing Foundry. Vaughan C. Reid. *Foundry,* v. 81, Apr. 1953, p. 102-107.

Equipment and installation for melting Al, high-conductivity pure Cu, Mallory alloys, and high-strength Cu-base alloys. (E10, Al, Cu)

182-E. Close Control Important in Making Intricate Aluminum Castings. Robert H. Herrmann. *Foundry,* v. 81, Apr. 1953, p. 108-113.

Control and inspection in molding and casting Al parts. Green sand, permanent molds, and a few plaster molds are used. (E11, E12, E16, Al)

183-E. Metallurgical Developments in Iron Foundries. A. J. D. Black. *Foundry Trade Journal,* v. 94, Mar. 12, 1953, p. 291-298.

Reviews recent progress in forming irons of clearly identified structures and properties produced by various methods of metallurgical control. Micrographs. (E25, CI)

184-E. Mechanized Foundry for Small Blackheart Malleable Castings. J. Roxburgh. *Foundry Trade Journal,* v. 94, Mar. 19, 1953, p. 321-331.

Molding machine practice; sand preparation and handling; molding and conveyer synchronization; cored work; jacketing, pouring, and shakeout; melting plant; and metal provision. Photographs. (E11, CI)

185-E. Mass-Production Casting by Investment Moulding. *Foundry Trade Journal,* v. 94, Mar. 19, 1953, p. 333-336.

History and present-day status of process for producing accurate castings. (E15)

186-E. The Control of Quality in the Melting and Casting of Aluminium Alloys for Working. R. T. Staples and H. J. Hurst. *Journal of the Institute of Metals,* v. 81, Mar. 1953, p. 377-391.

Effects of the alloying additions, impurities, and incidental contaminants on foundry practice, setting up of quality standards, and the ultimate properties of the material. Indicates degree of control possible through routine physical and chemical inspection at various stages. 18 ref. (E10, S general, Al)

187-E. Making Coronation Bells in Shell Moulds. *Machinery* (London), v. 82, Mar. 13, 1953, p. 475-480.

Construction of molds, sand mixtures, and production of bells. Photographs. (E16, Cu)

188-E. Shell Moulding With Urea-Formaldehyde Resins. *Machinery* (London), v. 82, Mar. 20, 1953, p. 526-532.

Choice of sand, pattern making, mold ejection, investment, core making, pouring, gating, and running. Photographs. (E16)

189-E. How X-3 Car Wheels Are Made. *Railway Age,* v. 134, Apr. 6, 1953, p 84-87

Advantages of the new design, graphite mold, pouring carbon steel, wheel design details, service tests, and static plate tests. Photographs. (E11, S21, CN)

190-E. Practical Contributions to the Study of Spheroidal Graphite Cast Iron. E. Piwowarsky. Henry Brutcher Translation 2927, 31 pages. (From *Giesserei Technisch-Wissenschaftliche Beihefte,* no. 6-8, 1952, p. 311-322.)

Experiments on the nodulizing effects of various additions to gray cast iron and on methods of introducing such additions into the melt. (E25, CI)

191-E. (German.) **Research on 99.999 Zn Alloys.** Wilhelm Hofmann, Friedrich Erdmann-Jesnitzer, and Heinrich Hanemann. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 417-421.

Zn die-casting alloys of Zn-Al and Zn-Al-Cu types were melted using 99.99 and 99.999 Zn. Reports results. Tables and graphs. (E13, Zn)

192-E. Foundry Characteristics of Aluminum and Magnesium. M. N. Martinson. *Canadian Metals,* v. 16, Feb. 1953, p. 28, 30; Mar. 1953, p. 34, 36.

Compares foundry characteristics of Al and Mg. Recommends procedures in all phases of foundry operations. The furnaces used and correct melting practices. Tables. (E general, Al, Mg)

193-E. Production of Nodular Iron With Calcium. Luiz Antonio de Araujo. *Colorado School of Mines, Quarterly,* v. 48, Jan. 1953, p. 47-67.

History, theories, and experimental work using Ca. Tables and micrographs. (E25, CI)

194-E. The Casting of Milling Cutters of Grey Cast Iron With Carbide Inserts. P. V. Paukov. *Engineers' Digest,* v. 14, Mar. 1953, p. 86, 90. (Translated and condensed from *Stanki i Instrument,* no. 4, 1952, p. 22-24.)

Designs of molds and techniques which insure good castings and long life of molds. (E11, T5, CI)

195-E. Ramming Cores With Reclaimed Sand. Harold W. Haynes. *Foundry Trade Journal,* v. 94, Mar. 26, 1953, p. 347-350.

An impeller-type rammer for producing certain types of cores. Diagrams and photographs. (E21)

196-E. The "C" Process of Casting. M. C. Dixon and R. S. Bushnell. *Foundry Trade Journal,* v. 94, Mar. 26, 1953, p. 355-364.

History, general properties, and costs of the process. Resins, sands, patterns, molding cycle, core preparation, and casting. Photographs. (E16)

197-E. A Method of Centrifugally Casting Titanium. O. W. Simmons, R. E. Edelman, and H. Markus. *Metal Progress,* v. 63, Mar. 1953, p. 72-74.

Process in which a casting can be made as soon as sufficient molten metal is obtained without superheating. Development of an induction furnace. (E14, Ti)

198-E. Investment Castings. They're Getting Bigger. J. R. Burns. *Product Engineering,* v. 24, Apr. 1953, p. 137-140.

Steps in the process and various types of patterns. Diagrams and photographs. (E15)

199-E. Design Tips for Changing to Die Casting. H. K. Barton. *Product Engineering,* v. 24, Apr. 1953, p. 174-178.

How specific details should be modified to meet good die-casting practice. Diagrams. (E13)

200-E. (German.) **A New Experience With Steel Molds for Pressure Casting.** H. M. Hiller. *Giesserei,* v. 40, Jan. 8, 1953, p. 16-24.

Phenomenon of cracking of steel molds for pressure casting is investigated. Causes and preventive means. Industrial experiments with brass pressure casting. Photographs. (E13, TS, Cu)

201-E. (Book.) **Conference Proceedings, Harrogate.** 100 pages. Association of Bronze and Brassfounders, 25, Bennetts Hill, Birmingham 2, England. 7s, 6d.

Complete account of proceedings of a productivity conference. Discusses manufacture of nonferrous components in brass foundry practice by means other than casting. (E general, Cu)

202-E. (Book.) **Dynasty of Ironfounders. The Darbys and Coalbrookdale.** Arthur Raistrick. Longmans Green and Company, Ltd., 6 and 7, Clifford St., London, W, England. 30s.

Development of the foundry craft from beginning of industrial revolution to the present time. (E general, A2, CI)

203-E. (Book—German) **(Handbook of Smelting and Alloying Practice in Casting of Metals.) Handbuch der Schmelz-und Legierungspraxis in der Metallgiesserei.** A. Schulenburg. 320 pages. 1952. Fachverlag Schiele & Schon, Berlin, Germany.

Reference book for apprentices and masters. Theory is kept at a minimum, and only modern types of equipment are described. Deals with heavy and light materials. (E10)

F

PRIMARY MECHANICAL WORKING

98-F. How National Tube Hot Extrudes Stainless Steel Tubing. D. I. Brown. *Iron Age,* v. 171, Mar. 19, 1953, p. 129-133.

Equipment, materials handling, and preparation of billets. Diagrams and photographs. (F26, SS)

99-F. Instrumentation Factors Affecting Production in Slab-Heating Furnaces. Carl M. Yaeger. *Instruments,* v. 26, Mar. 1953, p. 402-403 disc. p. 436-442.

Difficulties encountered which illustrate control problems. Solution, reasons for choice, and operational results. 8 ref. (F21)

100-F. Increasing Productivity of Fontana Blooming Mill. William A. Vogt. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 55-62; disc. p. 62-63.

Adaptation and modification of original equipment to increase production. Diagrams. (F23, ST)

101-F. Steel Defects Commonly Attributed to Heating. George Boal. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 64-67.

Reasons for some of the defects encountered in heating for rolling, particularly surface effects. Photographs. (F21, ST)

102-F. Mechanization of 12-In. Bar Mill. G. A. Henderson. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 107-112; disc. p. 112-113.

Rebuilding of mill has increased efficiency and production. Diagrams, photographs, and tables. (F23)

103-F. Rebuilding of 12-In. Bar Mill. James O. Dague. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 114-121.

Rebuilding job; comparison of old mill to the new one. Diagrams and photographs. (F23)

104-F. Forgings and Drop-Forgings in Ti-Alloy 150A. Thos. Reynolds. *Light Metals,* v. 16, Mar. 1953, p. 91-93.

Some of the forging characteristics of Ti alloys. Photographs and micrographs. (F22, Ti)

105-F. The Potentialities of Large Forging Presses. G. W. Richards. *Machinery* (London), v. 82, Mar. 13, 1953, p. 497-505.

Possibilities of forging large light alloy parts. Dimensional tolerances, preparation of forging stock, and die blocks. Diagrams. (F22, Al, Mg)

106-F. Tension Considerations in Spooling Enameled Wire. Richard Bliss. *Wire and Wire Products,* v. 28, Mar. 1953, p. 257-262, 316-318.

Tension as related to material, dimensions, surface characteristics, distributor traverse rate, and allowable variation. (F28)

107-F. Unique Non-Rotating Single Block Coiler and Non-Rotating Multiple-Block Takeup for Continuous Wire Processes. N. M. Hudak. *Wire and Wire Products,* v. 28, Mar. 1953, p. 269-270.

Describes a universal coiler which offers means of solving present-day high-speed and large bundle requirements of the wire mill. Includes low carbon and nonferrous wire drawing operations. Photographs and diagrams. (F28, CN, EG-a)

108-F. Use Impact Forging for Tough-to-Machine Parts. L. R. Denny. *Iron Age,* v. 171, Apr. 2, 1953, p. 149-152.

Faster production, less material waste, and greater economy in machine time and labor are possible if Al alloys are impact forged. Diagrams and photographs. (F22, Al)

109-F. Impact Forging Can Save You Money. Frank J. Pesak. *Iron Age,* v. 171, Apr. 2, 1953, p. 153.

Impact forging of SAE 1010 and 1020 steels. (F22, CN)

110-F. Metallurgical Aspects of Large Pressings, Forgings, and Extrusions for Aircraft. Harold Schor. *Metal Progress,* v. 63, Mar. 1953, p. 111-114, 182, 184, 186.

Report of ASME symposium on use of large presses for Al. (F22, F24, G4, Al)

111-F. 35,000-Ton Press. (Review of "Bliss Heavy Forging Presses", from *Bliss News Letter,* No. 14, Nov. 1952.) *Metal Progress,* v. 63, Mar. 1953, p. 186, 188, 190.

General design of 25,000 and 35,000-

ton forging presses ordered by the Air Force for pressing Al and Mg aircraft components. (F22, Al, Mg)

112-F. The Blacksmith's Art Speeds Our Plane Production. *Steel Horizons,* v. 15, no. 1, 1953, p. 20-21.

Techniques for the advancement of aircraft production place a major emphasis on heavy press forging. Photographs. (F22)

113-F. Special Tongs Facilitate Forging and Heat Treating Operations. *Steel Processing,* v. 39, Mar. 1953, p. 133-134.

Describes and illustrates tongs. (F22, J general)

114-F. The Theory of the Extrusion of Metals. R. Hill. "Strength & Testing of Materials", v. 6 Part I. Theoretical Papers on Strength and Deformation. 1952, p. 191-204.

Analysis of the two-dimensional problem of sheet extrusion. Direct and inverted extrusion. Extrusion pressure is evaluated in terms of the extrusion ratio and the compressive yield stress of the metal at the temperature and average speed of working. Diagrams. (F24)

115-F. (German.) **Investigation on Power and Work Required in Cold Forging of Various Steels.** Heinz D. Feldmann. *Stahl und Eisen,* v. 73, Jan. 29, 1953, p. 165-174.

Effects of pressing speeds and temperature on the power required. (F22, ST)

G

SECONDARY MECHANICAL WORKING

121-G. Guideposts to Titanium Cutting. V. J. Gauthier. *Steel,* v. 132, Mar. 23, 1953, p. 76-79.

Cutting fluids, feed rate, cutting speeds, tool angles, and chromium-plated high speed steel tools. Photographs. (G17, Ti)

122-G. Electric Arc Cutting of Aluminium. W. G. Warren. *Welding and Metal Fabrication,* v. 21, Mar. 1953, p. 88-91.

Process which employs an electric arc as heat source and discharge from a ferrous wire electrode as cutting agent. Photographs, micrographs, and tables. (G22, Al)

123-G. Groove Cutting for the Shop. R. G. Householder. *Welding Journal,* v. 32, Mar. 1953, p. 232-234.

What a groove-cutting nozzle will do and how to use it. Photographs. (G22)

124-G. Effect of Shot Peening Upon the Transformation of Austenite. E. N. Bolkhovitinova. Henry Brutcher Translation 2958, 5 pages. (From *Vestnik Mashinostroenia,* v. 32, no. 5, 1952, p. 67-69.)

Effect on austenite transformation in carburized Cr-Mn-Ti steel. Akulov anisometer, which was used for determination of quantity of retained austenite, is described. Practical applications of experimental results. (G23, N8, AY)

125-G. Abrasive Belts Speed Production Contour Polishing and Grinding. Dirck Olton. *American Machinist,* v. 97, Mar. 2, 1953, p. 101-103; Mar. 16, 1953, p. 136-139; Mar. 30, 1953, p. 106-110.

Production applications of offhand abrasive-belt contour grinding. Part 2: Developments in various offhand setups. Part 3: Semi-automatic and completely automatic polishing and grinding setups. Photographs. (G18, L10)

126-G. How to Understand Plain Carbon Steel. Samuel Storchheim. *American Machinist,* v. 97, Mar. 1953, p. 111-118.

Discusses metallurgical fundamentals so that the nonmetallurgist can select and work carbon steel with greater advantage. Graphs and micrographs. (G general, CN)

127-G. Punched Tape Guides Milling Machine Cutters. J. O. McDonough. *Electronics,* v. 26, Apr. 1953, p. 135-137.

Automatic vertical milling machine which cuts out each piece in response to instructions punched in paper tape. Diagrams. (G17)

128-G. Making Components for Agricultural Machinery. Interesting Methods Employed at the Kilmarnock Factory of Massey-Harris, Ltd. *Machinery* (London), v. 82, Mar. 13, 1953, p. 467-474.

Methods including machining half-pulleys for the variable-speed main transmission, shaft turning, and turning cast-iron V-pulleys. Diagrams and photographs. (G17, CI)

129-G. Cast Valve Tappets Redesigned for Formed Steel. Kenneth Rose. *Materials & Methods,* v. 37, Mar. 1953, p. 108.

Cold heading and carbonitriding of tappets made of 5120 steel. (G10, J28, AY)

130-G. Turning and Milling Titanium. Norman Zlatin. *Modern Metals,* v. 9, Mar. 1953, p. 88.

Machining properties of Ti alloys. (G17, Ti)

131-G. Titanium Carbide Alloys in Tooling. W. L. Kennicott. *Tool Engineer,* v. 30, Apr. 1953, p. 61-64.

Abstract of paper 21T15, "Tool Engineering Applications of Titanium Carbide Alloys", American Society of Tool Engineers. Mechanical and physical properties; metal cutting and forming; dies; tong points and guides; jigs and fixtures; and gages. Photographs and diagrams. (G17, T5, Ti)

132-G. Metal-Cutting With Wax Lubricants. J. B. Carse and A. E. Budner. *Tool Engineer,* v. 30, Apr. 1953, p. 65-72.

Abstract of paper 21T7, "Wax Lubricants in Metalworking", American Society of Tool Engineers. Defines waxes and presents tabulated information on cutting of Al, steel, and stainless steel. (G21, Al, ST, SS)

133-G. Economics of Spinning and Drawing. John W. Lengbridge. *Tool Engineer,* v. 30, Apr. 1953, p. 89-94.

Abstract of paper 21T8, "An Evaluation of Drawing vs. Spinning", American Society of Tool Engineers. Factors to be considered before using either process. (G4, G13)

134-G. Adjustable Speed D-C Drives for Deep-Draw Presses. C. E. Robinson and A. P. Di Vincenzo. *Applications and Industry,* Mar. 1953, p. 9-16.

Basic drive considerations and description of a typical drive. Diagrams, graphs, and photographs. (G4)

135-G. Which Gray Irons for Large Volume Production? E. A. Loria. *Iron Age,* v. 171, Apr. 9, 1953, p. 131-133.

Results of machinability studies. Graphs and micrographs. (G17, CI)

136-G. Use Right Draw Speeds for Better Electrical Properties. Samuel Storchheim. *Iron Age,* v. 171, Apr. 9, 1953, p. 135-138.

Investigation in which commercial 302 and 304 stainless steels were drawn, using wide variation of speeds. Tables and graphs. (G4, P15, SS)

137-G. Mass-Producing Low-Cost Blanking Dies. R. C. Beaver. *Modern Machine Shop,* v. 25, Apr. 1953, p. 126-131.

Method of constructing the pierce blank template. Photographs. (G2)

138-G. "Million Dollar" Forming Tool. Gilbert C. Close. *Modern Machine Shop,* v. 25, Apr. 1953, p. 154-156, 158, 160, 162, 164.

Use of cam-action dies for producing flanged and beaded stainless steel rings. Diagrams and photographs. (G1, SS)

139-G. Cutting Fluids. Their Role in Machining. *Steel,* v. 132, Apr. 13, 1953, p. 106-109.

Based on paper by S. J. Aeaubien and A. G. Cattaneo. How the four basic properties of a cutting fluid affect tool failure due to heat, wear, and welding. Effect on surface finish. Graphs and photographs. (G21)

140-G. A Check List for the Design of Progressive Dies. Federico Strasser. *Steel Processing,* v. 39, Feb. 1953, p. 66-70, 87.

List for checking blank and stock; cutting die plate; cutting punches; auxiliary members; die set; forming members; and operations. Diagrams. (G1)

141-G. (Swedish.) **Hardness and Punching Properties.** H. Hanemann. *Jernkontorets Annaler,* v. 137, no. 1, 1953, p. 27-33.

Experiments on relationship of metal hardness to the permanent impression made by a punch under a given load. The term "punch flow-limit" is defined as that least amount of specific surface pressure to leave a permanent impression on a metal. Graphs and tables. (G2, Q29)

142-G. (Book.) **Basic Sheet-Metal Practice.** J. W. Giachino. 240 pages. International Text Book Co., Laurel Publishers, 325 Ash St., Scranton, Penn. $5.

Elementary operations of measuring layout patterns, edges, seams, and notches. Uses of various tools. (G general)

143-G. (Book.) **Manual on Cutting of Metals With Single-Point Tools. Ed. 2.** 546 pages. 1952. American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Types, uses, and preparation of single-point tools; mechanical characteristics and structures of work material; definitions, functions, and classification of cutting fluids; cutting forces, gross and net power at the cutter; net unit power for machining metals using a single size cut; economics of metal cutting; and tabular data on cutting speeds and horsepower for various feeds and depths of cut when turning steel and cast iron. (G17)

144-G. (Book—Russian.) **The Forming of Nonferrous Metals and Alloys by Pressure.** V. G. Serdiukov and Ya. Ya. Tsiersch. 508 pages. 1947. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Metalworking machinery and processes for forming sheet, plate, strip, tubing, and profiles. (G general, EG-a)

H

POWDER METALLURGY

26-H. New Ternary Boride Compounds. Robert Steinitz and Ira Binder. *Powder Metallurgy Bulletin,* v. 6, Feb. 1953, p. 123-125.

Compounds with physical properties which make them desirable ingredients in cutting tool materials. (H11, T6, Co, Fe, Ni, Mo, B)

27-H. The Pseudo-Binary System ZrB_2-TiB_2. F. W. Glaser and W.

Ivanick. *Powder Metallurgy Bulletin,* v. 6, Feb. 1953, p. 126-132.

Rate of reaction for solid solution formation at various temperatures. Graphs. (H11, Ti, Zr, B)

28-H. Density Determination of Porous Metal Parts. Walter M. Schwarzkopf. *Powder Metallurgy Bulletin,* v 6, Feb. 1953, p. 134-135.

Technique for routine control method using silicone oils. (H11)

29-H. Bimetallic Metal-Powder Parts. V. V. Saklinskii. Henry Brutcher Translation 2968. 8 pages. (From *Vestnik Mashinostroeniia,* v. 32, no. 3, 1952, p. 76-79.)

Reports on two production processes recently developed by Orgavtoprom Institute for bimetallic parts. Particulars on production steps for thin-walled bearing inserts, lead-bronze powder layer on steel base, from preparation of powder mix to finishing operation. (H general, Cu, ST)

30-H. Recrystallization of Wrought Hydrogen-Sintered Molybdenum and Its Alloys. M. H. LaChance, W. L. Bruckart, C. M. Craighead, and R. I. Jaffee. *Transactions of the American Society for Metals,* v. 45, 1953; p. 314-332.

Recrystallization characteristics of H_2-sintered Mo from four commercial powders are compared. Effects of 12 alloying elements were investigated. (H11, N5, Mo)

31-H. (German.) The Special Position of Powder Metallurgy in Making Permanent Magnets. W. Hotop. *Metall,* v. 7, Jan. 1953, p. 1-9.

Sintering of Al-Ni-Co alloys with fine-grained stable structure having good mechanical properties. Graphs, diagrams, and photographs. (H general, SG-n)

32-H. Metal Powder Filters. A. J. Langhammer and Phillip Glick. *Product Engineering,* v. 24, Apr. 1953, p. 179-182.

Details of bronze filters produced by powder metallurgy process to be used for diffusing, separating, metering fluids, flame proofing, or sound deadening. Graphs and photographs. (H general, T8, Cu)

33-H. (German.) Notice on the Preparation of Intimately Mixed Iron and Copper Powders. A Report on the Chemistry of Mixtures. G. F. Hüttig and A. Vidmajer. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 272, no. 1-4, 1953, p. 40-44.

Experimental research in which Fe and Cu were precipitated as oxalates and reduced to metallic mixture. (H12, Fe, Cu)

34-H. (Book.) The Measurement of Particle Size in Very Fine Powders. H. E. Rose. 127 pages. Constable & Co., Ltd., 10 Orange St., London, W.C.2, England. 9s. net.

An introduction to particle size measurements. Defines size frequency, specific surface, and particle shape. Errors in size frequency due to deviations from streamline conditions. Theory of photo-extinction method and its application to nonspherical particles and water analysis. Determination by N_2 adsorption, tinting strength methods, and bulk density tests. (H11)

J

HEAT TREATMENT

71-J. Induction Heating Cuts Costs on Many Fronts. *Steel,* v. 132, Mar. 23, 1953, p. 80-82.

Manufacturers are taking advantage of modern induction heating techniques to improve quality, increase production, and lower costs in many types of operations. Photographs. (J2)

72-J. Carburizing, Nitriding, and Siliconizing of Tungstenized and Molybdenized Cases on Iron and Steel. E. Fitzer. Henry Brutcher Translation 2982, 18 pages.

Previously abstracted from *Archiv für das Eisenhüttenwesen.* See item 276-J, 1952. (J28, L15, ST, Fe)

73-J. Centralised Heat Treatment Equipment for Mining Gear. C. P. MacCarthy. *Colliery Guardian,* v. 186, Mar. 19, 1953, p. 343-346.

Furnace equipment, degreasing, inspection, and examination. (J general, L12, CN)

74-J. Job Lot Heat Treating Accomplished Easily by Versatile Pit Type Furnace. *Industrial Gas,* v. 31, Mar. 1953, p. 10, 27-28.

Features such as wide temperature range of 400 to 1800° F., controlled atmosphere, and basement installations. Diagrams and photographs. (J general)

75-J. Industrial Electric Furnaces. J. C. Howard. *Journal of the Iron and Steel Institute,* v. 173, Mar. 1953, p. 285-291.

Use of electric energy for metallurgical heating purposes; possible future trends in development and application. Discusses arc, resistance, and induction furnaces. (J general)

76-J. Salt Bath Case Hardening With Molybdenum and Tungsten. A Correlated Abstract. *Materials & Methods,* v. 37, Mar. 1953, p. 94-97.

Recent developments for improving surface properties of irons and steels by increasing W or Mo content of the surface layers. Tables and graphs. (J28, AY, TS)

77-J. Armor Plate Quenched in Hydraulic Press. *Modern Industrial Press,* v. 15, Mar. 1953, p. 24, 26.

A 2500-ton unit is set between hardening and draw furnaces with handling done on roller conveyors. Most plates are flat quenched but some are form quenched in dies. Photographs. (J26, AY)

78-J. Hardening of Metals. J. L. Meijering. *Philips Technical Review,* v. 14, Jan. 1953, p. 203-211.

Thermal methods of hardening after forming, such as quench hardening, precipitation hardening, and oxidation hardening are discussed and illustrated. Micrographs. (J26, J27)

79-J. Valley Wire Mill Modernizes Annealing Practice. Edmund D. Sickels. *Wire and Wire Products,* v. 28, Mar. 1953, p. 264-265.

Furnace used for heat treatment of various Cu-base alloys. Photographs. (J23, Cu)

80-J. (French.) Substitution of Boron for Alloying Elements in Carburizing and Heat Treating Steels. Robert Scherer and Karl Bungardt. *Revue de Métallurgie,* v. 50, Feb. 1953, p. 73-91; disc., p. 91-94.

Effect of B on hardenability and impact value of Cr-Mo and Cr-Ni carburized plates 50 mm thick. (J26, Q6, Cr)

81-J. What the Ferrous Metallurgist Should Know About Titanium. R. I. Jaffee. *Iron Age,* v. 171, Apr. 2, 1953, p. 162-166.

Discusses properties and structure of Ti and alloys to explain why they can't be quench hardened. (J26, Q general, M27, Ti)

82-J. Heat-Treatment of Newer Ensteels. R. Wilcock. *Metal Treatment and Drop Forging,* v. 20, Mar. 1953, p. 113-117; disc., p. 117-118.

Changes in heat treatment of direct hardening and casehardening steels. Tables and graphs. (J26, J28, ST)

83-J. Gas Carburizing Plant. *Overseas Engineer,* v. 26, Apr. 1953, p. 316-317.

Re-equipping a Netherlands plant with British equipment made to reduce distortion. Photographs. (J28)

84-J. Dual Frequency Heating. Lower Costs Open New Fields. M. E. Hackstedde. *Steel,* v. 132, Apr. 13, 1953, p. 140-141.

Low-frequency coils in tandem with high-frequency high-heat coils prove that induction heating can be practical in forging applications. Photographs. (J2, F22)

85-J. Induction Heating. Lester F. Spencer. *Steel Processing,* v. 39, Jan. 1953, p. 22-28, 42-43; Feb. 1953, p. 71-75.

Types of equipment for use as a heating medium for hot working, hardening or annealing, and joining of metals. Photographs and diagrams. 26 ref. (J2, F22, K8)

86-J. Heat Treating Round-Up for 1952. Howard E. Boyer. *Steel Processing,* v. 39, Jan. 1953, p. 30-36.

Developments and improvements in heat treating furnace equipment. Photographs. (J general)

87-J. The Salt Bath—a Production Tool. Lester F. Spencer. *Steel Processing,* v. 39, Mar. 1953, p. 120-130, 144.

Advantages of the salt bath, whether batch or mechanized. Photographs and diagrams. (J2)

88-J. Carbide Formation in Alloy Steels During High Tempering. G. V. Kurdyumov and M. D. Perkas. Henry Brutcher Translation 3014, 6 pages. (From *Doklady Akademii Nauk SSSR,* v. 87, no. 1, 1952, p. 41-43.)

Data on steel hardness as function of tempering temperature, results of X-ray study of carbide residues, and tempering temperatures at which special carbides are formed. Steels containing 0.11% C, 1.40% V, 1.48% Mn; and 0.10% C, 2.14% Mo were studied. (J29, AY)

89-J. (German.) Fundamental Considerations on Annealing of Cold-Rolled Steel Strip. A. Pomp. *Stahl und Eisen,* v. 73, Jan. 29, 1953, p. 133-138.

General discussion including effects of annealing temperature and time; previous cold deformation; and rate of cooling on structure and properties of cold rolled strip steels of medium and high carbon. (J23, CN)

90-J. (German.) Experience With Four-Chambered Pot Annealing Furnaces. Werner Feige and Alfred Neuhaus. *Stahl und Eisen,* v. 73, Jan. 29, 1953, p. 139-147.

Cloverleaf furnaces and their operation for annealing steel coils. Superheating the outer windings did not affect toughness. Yield was doubled, making possible 1-2 tons per hr. Diagrams, charts, photographs, and tables. 8 ref. (J23, ST)

91-J. (German.) Design, Operation, and Annealing Results of an Electrically Heated Continuous Roller-Hearth Annealing Furnace for Cold Rolled Strip in Coils. Josef Keutmann and Hans Martin Junius. *Stahl und Eisen,* v. 73, Jan. 29, 1953, p. 147-158.

New annealing process features continuous heating of coils from both edges. Construction and operation of furnace. Power consumption and calculated efficiencies. Photographs. (J23, ST)

92-J. (Book—Russian.) Dimensional Change of Steel From Thermochemical Treatment. Carburizing and Nitriding. S. F. Yurev. 308 pages. 1950. Governmental Scientific - Technical Publishing House, Moscow, U.S.S.R.

Complex mathematical analyses for dimensional change of various shapes during nitriding and carburizing are deduced from data obtained from differential dilatometry. (J28, ST)

K

JOINING

204-K. Small Rivets for Big Jobs. Robert M. Gordon. *Product Engineering,* v. 24, Mar. 1953, p. 119-127.

Use of tubular, semitubular, and small diameter rivets for joining low-cost, high-production assemblies. Recommended clinch allowances, hole clearances, and joint configurations for various rivet sizes. Diagrams, photographs, and tables. (K13)

205-K. A Review of the Compositions, Properties and Uses of Silver Solders in Industry. W. J. Smellie. *Sheet Metal Industries,* v. 30, Mar. 1953, p. 193-201, 206.

Includes joint making ability of Ag solders, properties of Ag-soldered joints, methods of heating, and choice of brazing method and solder. Photographs and graphs. (K7, Ag, SG-f)

206-K. The Welding of Austenitic Corrosion- and Heat-Resisting Steels. *Sheet Metal Industries,* v. 30, Mar. 1953, p. 217-228, 244.

Review of welding methods, types of steel available, metal-arc process, automatic metal-arc welding of 18-8 type steel using covered electrodes, inert-gas-shielded metal-arc welding with consumable electrodes, and seam welding. Micrographs, photographs, and tables. (K1, SS)

207-K. Inert-Gas Metal-Arc Welding of Aluminium Alloys. P. T. Houldcroft. *Welding and Metal Fabrication,* v. 21, Feb. 1953, p. 58-61; Mar. 1953, p. 99-102.

Methods of welding in which features of flux-coated metal and tungsten-arc are combined. Preparation for welding, welding techniques, special equipment for shipbuilding, and weld strengths. (K1, Al)

208-K. Inert-Arc Welding Technique for Eliminating Backing Rings in Piping. R. A. Mueller and W. B. Root. *Welding Journal,* v. 32, Mar. 1953, p. 205-214; disc., p. 214-216.

Numerous experimental and actual shop welds on a variety of pipe materials which successfully demonstrate the practicability of inert-arc welding method. Tabulates information for carbon steel, Cr-Mo steels, and Type 347 stainless steel. Photographs, micrographs, and diagrams. (K1, CN, AY, SS)

209-K. Resistance Welding of Dissimilar Metals to Magnesium for Electrical Connections. Paul Klain and H. W. Croisant. *Welding Journal,* v. 32, Mar. 1953, p. 217-224.

Method for attaching wires to Mg dry batteries and to other Mg parts where electrical contact is necessary. Conditions for direct welding of Cu and other wires to Mg. Tables, micrographs, and photographs. (K3, Mg, Cu, Zn, ST)

210-K. Unity in Welded Steel Construction. Robert S. Hale. *Welding Journal,* v. 32, Mar. 1953, p. 225-229.

Full potentialities and advantages of welding as a construction tool; problems encountered during fabrication; and practical methods to control distortion. Diagrams and photographs. (K general, ST)

211-K. Temperature Distribution During Flash Welding of Steel. Part II. E. F. Nippes, W. F. Savage, S. S. Smith, J. J. McCarthy, and G. Grotke. *Welding Journal,* v. 32, Mar. 1953, p. 113s-122s.

Effects of parabolic flashing conditions on temperature distribution in AISI 1020 steel were studied using round specimens of three different diameters. Graphs and tables. 5 ref. (K3, CN)

212-K. The Role of Weld Metal Area in Welding Hardenable Steels. C. R. McKinsey and J. F. Collins. *Welding Journal,* v. 32, Mar. 1953, p. 125s-131s.

Studies of fundamental relationships of various factors influencing the heat-affected zone in hardenable steels. Graphs and micrographs. (K9, ST)

213-K. Effects of Carbon, Oxygen, and Nitrogen on Welds in Titanium. D. C. Martin. *Welding Journal,* v. 32, Mar. 1953, p. 139s-154s.

Investigation to determine limits of C, O_2, and N_2 which can be tolerated in Ti spot welds and welds made with inert-gas shielded arc. Tables, diagrams, graphs, and micrographs. (K1, K3, Ti)

214-K. The Weldability of Austenitic Manganese Steels. F. Danhier. *Welding Journal,* v. 32, Mar. 1953, p. 155s-156s.

Extended abstract by G. E. Claussen from *Arcos,* July 1952, p. 3203-3217. Effects of C, Si, P, and of the electrode composition. (K9, AY)

215-K. It's Easy to Braze Titanium. Harlan L. Meredith. *American Machinist,* v. 97, Mar. 30, 1953, p. 120-121.

Use of pure Ag filler metal, induction heat, inert gas shielding, and proper joint design. (K8, Ti)

216-K. Local Carbide Segregation and Decarburization in Welded Joints. H. S. Blumberg and I. A. Rohrig. *Combustion,* v. 24, Mar. 1953, p. 36-41.

Investigation of welded Cr-Mo steel in steam power plant service. Tables and micrographs. (K9, AY)

217-K. Here's How Welding Builds Stainless Steel "Lungs" for B-29's. *Industry & Welding,* v. 26, Apr. 1953, p. 42-43, 45, 73.

Welding problems, types of welding, and parts. Photographs. (K general, T24, SS)

218-K. Production-Line Setup Speeds Fabrication of All-Welded Boilers. Fred D. Mosher. *Industry & Welding,* v. 26, Apr. 1953, p. 59-60, 62, 92, 94-95.

Standardization and partial assembly-line welding production methods in the building of package boilers. Photographs. (K general, T26)

219-K. Setup, Preparation and Procedure For Welding Navy Flying Boats. Lou Barrett and Chuck Wood. *Industry & Welding,* v. 26, Apr. 1953, p. 64-68, 70-71.

Inert-gas shielded arc, resistance, and shielded metallic-arc methods of welding. Photographs. (K1, K3)

220-K. Aluminum Additive Eliminates Porosity in Inert-Gas Arc Welding Operations. Matthew S. Mirantz. *Industry & Welding,* v. 26, Apr. 1953, p. 75-76, 78-79.

Addition of Al during inert-arc welding of rimmed steels to stop turbulence caused by escaping gases and also produce sound welds. (K1, CN)

221-K. Pure Silver Forms Strongest Brazed Joints in Titanium. H. L. Meredith. *Iron Age,* v. 171, Mar. 26, 1953, p. 143-146.

Advantages of using inert-induction Ag brazing. Micrographs and photographs. (K8, Ti, Ag)

222-K. A New Maintenance Tool for Steel Mill Use. J. J. Barry. *Iron and Steel Engineer,* v. 30, Mar. 1953, p. 92-97; disc. p. 97.

New arc welding process and equipment that simplify repair and maintenance operations. Photographs. (K1)

223-K. Advanced Planning Leads to Consistent, High Quality Spot-welds. J. Heuschkel. *Materials & Methods,* v. 37, Mar. 1953, p. 88-91.

Problem of producing quality welds which do not require checking. (K3)

224-K. Practical Stud Welding. R. W. Taylor. *Metal Industry,* v. 82, Mar. 20, 1953, p. 225-227.

Early difficulties in development of stud welding, and the process as it is practiced today. Features necessary for its success. Photographs. (K1)

225-K. Welding Stainless Steels Has Its Problems. W. G. Blackwell. *Steel,* v. 132, Apr. 6, 1953, p. 138-139.

Compares carbon steel, straight Cr steel, and Cr-Ni steel with respect to electrical resistance, thermal conductivity, melting points, and coefficients of expansion. Gives practical considerations for minimizing welding problems. (K general, P general, CN, AY)

226-K. Metal Bonding. A Report on Current Practices. O. W. Loudenslager. *Tool Engineer,* v. 30, Apr. 1953, p. 78-84.

Abstract of paper 21T12, American Society of Tool Engineers. Processing problems, physical properties of adhesives, uses of high-strength adhesives; and sandwich materials, core materials, processing, properties, testing materials, and future developments. Photographs. (K12)

227-K. (French.) **Generalized Conditions for Welding Metallic Frameworks.** H. Lepeu. *Soudure et Techniques Connexes,* v. 6, Nov.-Dec. 1952, p. 286-289.

Arc welding of a building framework made of bessemer steel. Photographs. (K1, T26, CN)

228-K. (French.) **A Case of Cracking by Parasitic Arcs.** R. Quigna. *Soudure et Techniques Connexes,* v. 6, Nov.-Dec. 1952, p. 291-292.

Presence of cracks near the weld bead of a piece of soft steel. Micrographs. (K1, CN)

229-K. The Electric Arc in Argon and Helium. T. B. Jones, Merrill Skolnik, and W. B. Kouwenhoven. *Applications and Industry,* Mar. 1953, p. 16-21.

Progress report of the study of arc characteristics in various atmospheres using argon and helium with tungsten electrodes. Graphs and diagrams. (K1, W)

230-K. Submerged Arc Welding Saves Time. *Canadian Metals,* v. 16, Mar. 1953, p. 46-47.

Time saving in fabrication of heavy steel by using submerged-arc welding and a new technique which eliminates preliminary hand welding. (K1, ST)

231-K. Soldering and Brazing With Paste Alloys. D. C. Dilley. *Electrical Manufacturing,* v. 51, Apr. 1953, p. 119-123, 360.

Performance of solder joints can be improved and costs reduced by using powdered solder alloys blended with fluxing, cleaning, and tinning agents. Photographs. (K7, K8)

232-K. Power Supplies and Resistance Welders. A. B. White. *Industry and Power,* v. 64, Apr. 1953, p. 86-89, 100.

Analyzes original problems and shows how recent improvements are producing greater satisfaction for both distribution and welding engineers. Diagrams. (K3)

233-K. Rotating Fixtures Speed Manual Silver Brazing. *Industry & Welding,* v. 26, Apr. 1953, p. 47-49, 51.

Equipment and handling techniques. Photographs. (K8)

234-K. Make Your Electric Welding Operations Safer. W. Schweisheimer. *Iron Age,* v. 171, Apr. 2, 1953, p. 160-161.

Hazards and ways to overcome them. (K1, A7)

235-K. Resistance Welding Gives Better Glass-to-Metal Joints. A. J. Wyzenbeek. *Iron Age,* v. 171, Apr. 9, 1953, p. 146-148.

Advantages of using resistance welding for hermetically sealing electrical feed-through terminals. Diagrams and photographs. (K11, K3)

236-K. Electrical Contacts Align Weld Jig. George Morton. *Modern Machine Shop,* v. 25, Apr. 1953, p. 144-146.

How a critical tube welding alignment problem was solved by using an electrical "saddle-equipped" jig. (K1)

237-K. Designing Around Inert-Gas Metal-Arc Welded Stainless, Nickel and Stainless Clads, Copper, Copper-Base Alloys, and Aluminum. J. H. Berryman. *Product Engineering,* v. 24, Apr. 1953, p. 171-173.

Characteristics of the process. (K1, SS, Ni, Cu, Al)

238-K. Welding Fills the Bottle. *Steel Horizons,* v. 15, no. 1, 1953, p. 12-13.

Joining Cr-Ni steel to straight Cr steel. Photographs. (K general, SS)

239-K. Underframes. A Job for Automatic Welding and Cutting. Fred M. Burt. *Welding Engineer,* v. 38, Apr. 1953, p. 39-41, 52.

Fabrication methods employed for underframes of 40-ft. boxcars. Flame cutting of plates and joining cross members. Photographs. (K1, G22)

240-K. Braze Welding on Big Repair Jobs. Herman C. Phelps. *Welding Engineer,* v. 38, Apr. 1953, p. 44-47.

Six examples of making big repairs on heavy equipment. Photographs. (K8, CI, Cu)

241-K. Brazing as a Production Medium. Lester F. Spencer. *Welding Engineer,* v. 38, Mar. 1953, p. 52-56; Apr. 1953, p. 53-57.

Brazing strength vs. clearance and selection of brazing alloys and fluxes. Torch, resistance, and incandescent brazing; induction heating; salt bath; and controlled-atmosphere furnace. Problems pertaining to brazing of Al alloys, Cu-base alloys, carbon steels, stainless steels, and high-Ni alloys. Helpful hints on joint design and on methods for supporting the assemblies prior to and during brazing. (K8, Al, Cu, CN, SS, Ni)

242-K. What Kind of Welding Is It? *Welding Engineer,* v. 38, Apr. 1953, p. 62-63.

A 40-kva. combination forming machine and resistance welder which satisfactorily joins Cr-plated steel tubing. Photographs. (K3, G general, ST, Cr)

243-K. (French.) Welding in the John Cockerill Shipyards at Hoboken, Belgium. M. Conrad, H. Herbiet, and H. Bersoux. *Revue de la Soudure,* v. 8, no. 3, 1952, p. 134-144.

Shows that material and labor costs are reduced by welding. (K general, T22, CN)

244-K. (German.) Gas Blisters in Welded Seams. W. Hummitzsch. *Schweisstechnik,* v. 7, Jan. 1953, p. 1-6.

Blister and pore formation by sulphur during welding with covered electrodes and bare wires. (K1)

245-K. (German.) Welding Under Stress. (Concluded.) H. Melhardt. *Schweisstechnik,* v. 7, Jan. 1953, p. 6-11.

Bridging of weak spots by hard facing; welding ribs and joints. The making of a bridge bar is also included. Diagrams. (K general, L24)

246-K. (German.) Gas Welding of 18-8 Cr-Ni Steel. H. Siegenthuler. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 43, Feb. 1953, p. 25-29.

Bending, corrosion, chemical, and metallographic tests which illustrate the dangers involved in older methods of gas welding. (K2, K9, SS)

247-K. (Book.) Basic Welding Principles. Emanuele Stieri. 220 pages. Prentice Hall, Inc., 70 Fifth Ave., New York 11, N. Y. $5.75.

Two sections consist of oxy-acetylene welding and cutting, and electric arc welding. (K general)

248-K. (Book.) Industrial Brazing. H. R. Brooker and E. V. Beatson. 344 pages. Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E., 1, England. (British Book Center, 122 East 55th St., New York 23, N. Y.) $7.50.

Problems involved in selecting appropriate brazing process for various types of work. Suggestions for improved methods of inspection and testing. (K8)

249-K. (Book.) Weldability of Metals. (Procedure Handbook of Arc Welding Design and Practice.) Ed. 9. Chap. II. 142 pages. 1952. Lincoln Electric Co., 12818 Coit Rd., Cleveland 17, Ohio.

Characteristics affecting weldability; tests for checking weldability; choice of steels; effect of common elements; and effect of heat on weld and base metal. Welding of high-Mn steels, Al alloys, Cu, Ni, clad steels, forgings, cast steel, cast iron, wrought iron, ingot iron, galvanized steel, terne plate, and enameling stock. (K9)

250-K. (Book.) The Welding of Austenitic Corrosion and Heat Resisting Steels. 207 pages. British Welding Research Assoc., 29 Park Crescent, London, W. 1, England. 27s. 6d. net.

Deals with individual processes, describing equipment, recommended techniques, and quality of the resultant welds. Includes metal-arc, submerged-arc, argon-arc, oxy-acetylene, atomic hydrogen, carbon-arc, resistance and oxy-acetylene pressure welding. Also concerned with oxygen cutting methods, heat treatment after welding, surface finishing, inspection, and welders' competency tests. (K general, SS)

L

CLEANING, COATING AND FINISHING

184-L. The Protection of Steel Structures in Salt Atmospheres. (Condensation.) H. E. Bright. *Australasian Engineer,* Jan. 7, 1953, p. 69-71.

Tests for proving relative value of three types of surface preparation, two primers, and two types of synthetic resin vehicles for cover coats of paint. (L26, CN)

185-L. The Manufacture and Properties of Clad Steel Plates. T. T. Watson. *Blast Furnace and Steel Plant,* v. 41, Mar. 1953, p. 318-320, 326-327, 351, 354-355.

Facilities required for processing clad metals and carbon steels. Micrographs and tables. (L22, AY, CN)

186-L. The Filtration and Pumping of Plating Solutions. G. T. Colegate. *Electroplating and Metal Finishing,* v. 6, Jan. 1953, p. 11-13; Feb. 1953, p. 51-53, 55-57; Mar. 1953, p. 85, 87-89, 91, 93-94.

Part 4 describes, diagrams, and illustrates precoated filters. Part 5: Precoating, uncoated filter packs, candle and sleeve-type filters, and auxiliary equipment. Part 6: The different pumps which are used. Diagrams and photographs. (L17)

187-L. Influence of Bath Composition and Operating Conditions in Modern Silver Plating. *Electroplating and Metal Finishing,* v. 6, Mar. 1953, p. 83-84.

Influence of various components of the Ag bath on cathode polarization, maximum permissible current density, gloss, and smoothness of coating. Conclusions regarding optimum composition and operating conditions for producing moderately thick Ag deposits. Graphs. (L17, Ag)

188-L. "Pinholing" and "Boiling" in Enamelled Light-Iron Castings. E. Holland. *Foundry Trade Journal,* v. 94, Mar. 5, 1953, p. 273-279.

Trial and error approach for determining reasons for rejects which occur in enamelling light iron castings. Photographs, micrographs, and tables. (L27, CI)

189-L. Brushes. Production Tools for Good Surface Finishes. R. O. Peterson. *Iron Age,* v. 171, Mar. 19, 1953, p. 134-137.

Brushing can remove burrs, slivers, and other surface imperfections without appreciably changing the shape or dimensions of a part. Brush flexibility permits controlled blending of surface irregularities. Factors involved in brush selection. Photographs. (L10)

190-L. Recent Developments in Paint. Rolt Hammond. *Machinery Lloyd* (Overseas Ed.), v. 25, Feb. 28, 1953, p. 73-75, 77, 79-80.

Paints and coatings developed to prevent corrosion of ferrous and nonferrous materials. Photographs. (L26)

191-L. Water Impurities and Electroplating. James Boyd Smith. *Metal Finishing,* v. 51, Feb. 1953, p. 69-72, 74; Mar. 1953, p. 65-69.

Effect of water impurities on various plating baths. Water treatment processes applicable to removing impurities. Diagrams and photographs. 68 ref. (L17)

192-L. Manufacturing Name Plates. R. E. Pettit. *Metal Finishing,* v. 51, Mar. 1953, p. 60-64, 81.

Etching, anodizing, and plating operations. Photographs. (L12, L17, L19)

193-L. Surface Finishing the Stainless Steels. Lester F. Spencer. *Metal Finishing,* v. 51, Mar. 1953, p. 70-77.

Equipment used in grinding, polishing, and buffing stainless steel. Photographs and tables. (L10, G18, SS)

194-L. Effects of Air Agitation in Sulfuric Acid Anodizing. R. C. Spooner. *Metal Finishing,* v. 51, Mar. 1953, p. 78-81.

Air agitation alters temperature at areas where anodic film is being formed and influences the characteristics of the anodic coating. Graphs and tables. (L19, Al)

195-L. Temperature in Electroplating Practice. J. Liger. *Metal Finishing,* v. 51, Mar. 1953, p. 82-83.

Extended English abstract from *Galvano,* Paris, v. 21, p. 15-17. Relevant factors involved in connection with effect of temperature on the plating bath. (L17)

196-L. Acidproof Cement Lining Halts Corrosion in Vacuum Flasher Column. D. H. Stormont. *Oil and Gas Journal,* v. 51, Mar. 23, 1953, p. 255-257.

Advantages and process of applying acidproof cement which prevents high temperature corrosion by sulfur. Photographs. (L26)

197-L. Preventing Metallic Corrosion by Modern Painting Techniques. H. W. Rudd. *Paint Manufacture,* v. 23, Feb. 1953, p. 41-44, 63; Mar. 1953, p. 77-80, 93.

Development of paint systems to combat corrosion of iron and steel. Methods for removal of mill scale, and recent developments that have taken place in priming formulations. Necessity of using media of low water permeability for top coats, and employment of cathodic protection methods in conjunction with paint systems. 17 ref. (L26, R10, ST)

198-L. Nonionics. The All-Surface Cleaners. Manuel N. Fineman. *Soap and Sanitary Chemicals,* v. 29, Feb. 1953, p. 46-49; Mar. 1953, p. 50-53, 114.

Dynamic detergency test, precision of test, and differences between ionics and nonionics. Use for metal and glass surfaces. Wetting phenomena, performance on different substrates, alkaline salts, and blends. Graphs and photographs. (L12)

199-L. Drums Come Clean and Rust-Inhibited. *Steel,* v. 132, Mar. 23, 1953, p. 84.

Cleaning and phosphating process provides chemically clean and protectively coated drums that hold their finish longer. (L12, L14, ST)

200-L. Surface Impregnation of Plain Carbon Steel With Tungsten or Molybdenum From Salt Baths. E. Fitzer. Henry Brutcher Translation 2975, 23 pages.

Previously abstracted from *Archiv für das Eisenhüttenwesen.* See item 969-L, 1952. (L15, J28, CN, CI)

201-L. (French.) **Electrolytic Cadmium Plating.** J. Liger. *La Métallurgie et la Construction Mécanique,* v. 84, Dec. 1952, p. 969, 975; v. 85, Jan. 1953, p. 58-59

Part 1: A general discussion comparing Cd with Zn plating. Part 2: Cd plating baths and surface preparation. (L17, Cd)

202-L. (French.) **Some Uses of Silicones in the Production of Heat Resistant Materials.** P. H. Morel. *Métaux Corrosion-Industries,* v. 27, Dec. 1952, p. 511-514.

Types and properties of silicones, their uses in aviation, enamels for light alloys, and molding powders. (L27, E19, SG-h)

203-L. Cronak Treatment Simplified. *American Pressman,* v. 63, Mar. 1953, p. 20, 22.

Treatment of Zn plates to prevent oxidation. (L14)

204-L. How We Finish Steel Kitchen Cabinets. Edward Schneider. *Industrial Finishing,* v. 29, Mar. 1953, p. 28-30, 32, 34.

Equipment layout, operations performed, tests made, and conditions maintained. Photographs. (L general)

205-L. Cleaning, Painting, and Lithographing Steel Drums. Ralph H. Gieser, Jr. *Industrial Finishing,* v. 29, Mar. 1953, p. 68-70, 72, 74, 76, 78.

Process for painting heavy-gage steel sheets before they are formed. Photographs. (L26, CN)

206-L. Anodic Polarization of Passive and Non-Passive Chromium-Iron Alloys. Herbert H. Uhlig and Glenn E. Woodside. *Journal of Physical Chemistry,* v. 57, Mar. 1953, p. 280-283.

Data for 0-16.7% Cr-Fe alloys in 3% Na_2SO_4. Critical current densities are given for passivity accompanied by sudden reduction of anodic dissolution and a pronounced noble potential range from 150 ma. per sq. cm. for iron to 0.05 ma. per sq. cm. for 11.6% Cr. Graphs and tables. (L19, Fe, SS)

207-L. Heavy Rhodium Electroplates Now Possible. Alfred M. Weisberg. *Materials & Methods,* v. 37, Mar. 1953, p. 85-87.

Rh can be deposited on most common metals and provides excellent corrosion and water resistance. (L17, R4, Rh)

208-L. Defects in Barrel and Drum Plating. O. Niedermeyer. *Metal Finishing,* v. 51, Mar. 1953, p. 82.

Previously abstracted from *Metalloberfläche.* See item 362-L, 1952. (L12, L16, CN, Zn)

209-L. Black Oxide Applied in Rotating Barrel. *Metal-Working,* v. 9, Apr. 1953, p. 4-5.

Process for cleaning and finishing steel parts. (L12, L14, ST)

210-L. For Aluminum. Colorful Vitreous Enamel. *Modern Metals,* v. 9, Mar. 1953, p. 80-83.

Physical qualities of enamels, method of application, pretreating Al stock, enameling procedure, advantages, disadvantages, and market prospects. Photographs. (L27, Al)

211-L. For Magnesium. A New Anodic Coating. H. K. De Long. *Modern Metals,* v. 9, Mar. 1953, p. 90, 92.

Process which produces abrasion resistant coating and can be applied to standard alloys as well as unalloyed Mg. Tables. (L19, Mg)

212-L. Industrial Painting of Aluminium Products. H. J. Testro. *Paint Manufacture,* v. 23, Mar. 1953, p. 86-89, 93.

Suitable methods of surface preparation for Al and Al alloys; cleaning methods and other treatments. Suitable paint finishes and methods of stripping paint films from these surfaces. (L26, Al)

213-L. "Why" as Applied to Cyanide Zinc Plating. Thomas J. Menzel. *Plating,* v. 40, Apr. 1953, p. 364-365, 377.

Reasons for dull, rough, thin, and blistered deposits. (L17, Zn)

214-L. Cleaning and Preparation of Metals for Electroplating. V. Oil Spreading Rates. Henry B. Linford and Edw. B. Saubestre. *Plating,* v. 40, Apr. 1953, p. 379-386.

Determines spreading rates of oils on steel surfaces under conditions wherein the atomizer test may be used industrially. Effect of spreading on cleaning index values obtained with this test. (L12, ST)

215-L. Metalization of Plastics. Harold Narcus. *SPE Journal,* v. 9, Mar. 1953, p. 26-29.

Methods of applying and uses of metal coatings on plastics. Tables. 17 ref. (L general)

216-L. (German.) **Industrial Investigation of an Installation for Electrostatic Oiling of Steel Tubing Surfaces.** Ottomar Schaffer and Wilhelm Feldmann. *Stahl und Eisen,* v. 72, Dec. 18, 1952, p. 1662-1665.

New electrostatic-spraying process for applying oils and paints. Advantages. Tables and graphs. (L26, ST)

217-L. Bureau Is Evaluating Vinyl Paints. W. S. Humphrey, Jr., and F. M. Van Etten. *Bureau of Ships Journal,* v. 1, Apr. 1953, p. 39-43.

Tests, applications, and results on the vinyl ship-bottom paint system. Photographs and tables. (L26)

218-L. An Electron - Micrograph Study of Oxide Films on Electropolished Surfaces of Iron. E. J. Caule and M. Cohen. *Canadian Journal of Chemistry,* v. 31, Mar. 1953, p. 237-241.

Study of surface topography produced by electropolishing of Fe in a HCl-perchloric acid bath. Micrographs. 15 ref. (L13, Fe)

219-L. Coating Research Extends Life. P. M. Hess. *Electrical World,* v. 139, Apr. 6, 1953, p. 90-93.

Tests of 16 different coatings which prove merit of vinyl products and establish procedure for preparing and painting steel to prolong useful life. (L26, CN)

220-L. Coating Steel Strip Automatically Prior to Fabrication. *Finish,* v. 10, Apr. 1953, p. 32-33.

Special painting machines. Photographs. (L26, ST)

221-L. Automatic Finishing for Metal Furniture. R. J. Deisenroth. *Finish,* v. 10, Apr. 1953, p. 45, 48, 68.

New continuous finishing system which incorporates flow coating and electrostatic spraying. Photographs and diagrams. (L26, ST, Al)

222-L. Development of Thiokol Polymer Protective Coatings for Steel. Anthony P. Massa, Herman Colon, and W. Fred Schurig. *Industrial and Engineering Chemistry,* v. 45, Apr. 1953, p. 775-782.

Development of polysulfide protective coatings. Test data. 12 ref. (L26, ST)

223-L. Polishing and Barrel Finishing. L. Mable. *Metal Industry,* v. 82, Mar. 13, 1953, p. 206-207; Mar. 27, 1953, p. 244-246.

The problems which arise in organization of a polishing department and means for their solution. Layout of barrel finishing departments. Different types of barreling machines and type of work for which they are suited. Photographs. (L10)

224-L. Vapor Deposited Coatings for Titanium. *Metal Progress,* v. 63, Mar. 1953, p. 192, 194.

Condensed from "Research and Development of Methods of Vapor Deposited Coatings for Titanium and Titanium Alloys; Final Technical Report", Report no. 401/48/B-10, by Sam Tour & Co., Inc., for Watertown Arsenal. (L25, Ti)

225-L. Practical Aspects of Zinc and Cadmium Plating. Edwin F. Ottens. *Products Finishing,* v. 17, Apr. 1953, p. 24-26, 28, 30, 32, 34, 36, 38, 40, 42, 44.

Prewar preference for Cd, present position of Cd, Zn plating, operating conditions, removal of impurities, cleaning preparatory to plating, pickling, treatment after Zn plating, and black coatings on Zn. (L17, Cd, Zn)

226-L. Vacuum Impregnation of Castings Forms Base for High Quality Paint Finish. John Starr. *Products Finishing,* v. 17, Apr. 1953, p. 48-52, 54.

Castings found difficult to finish with paint, varnish, lacquer, or enamel by reason of pores in the metal, may be impregnated with Na_2SiO_3, vinyl lacquer, styrene, or phenolic resin by vacuum processing. Successfully used with Al and Cu. Photographs. (L26, E25, Al, Cu)

227-L. Ceramic Coatings Boost Alloy Steel Use. Fred D. Shaw. *Steel,* v. 132, Apr. 13, 1953, p. 110, 112.

Advantages of using the coatings. Coating procedure. (L27, ST)

228-L. Liquid Blanket Reduces Oxidation of Molten Zinc. A. A. Paterson. *Steel,* v. 132, Apr. 13, 1953, p. 136, 138.

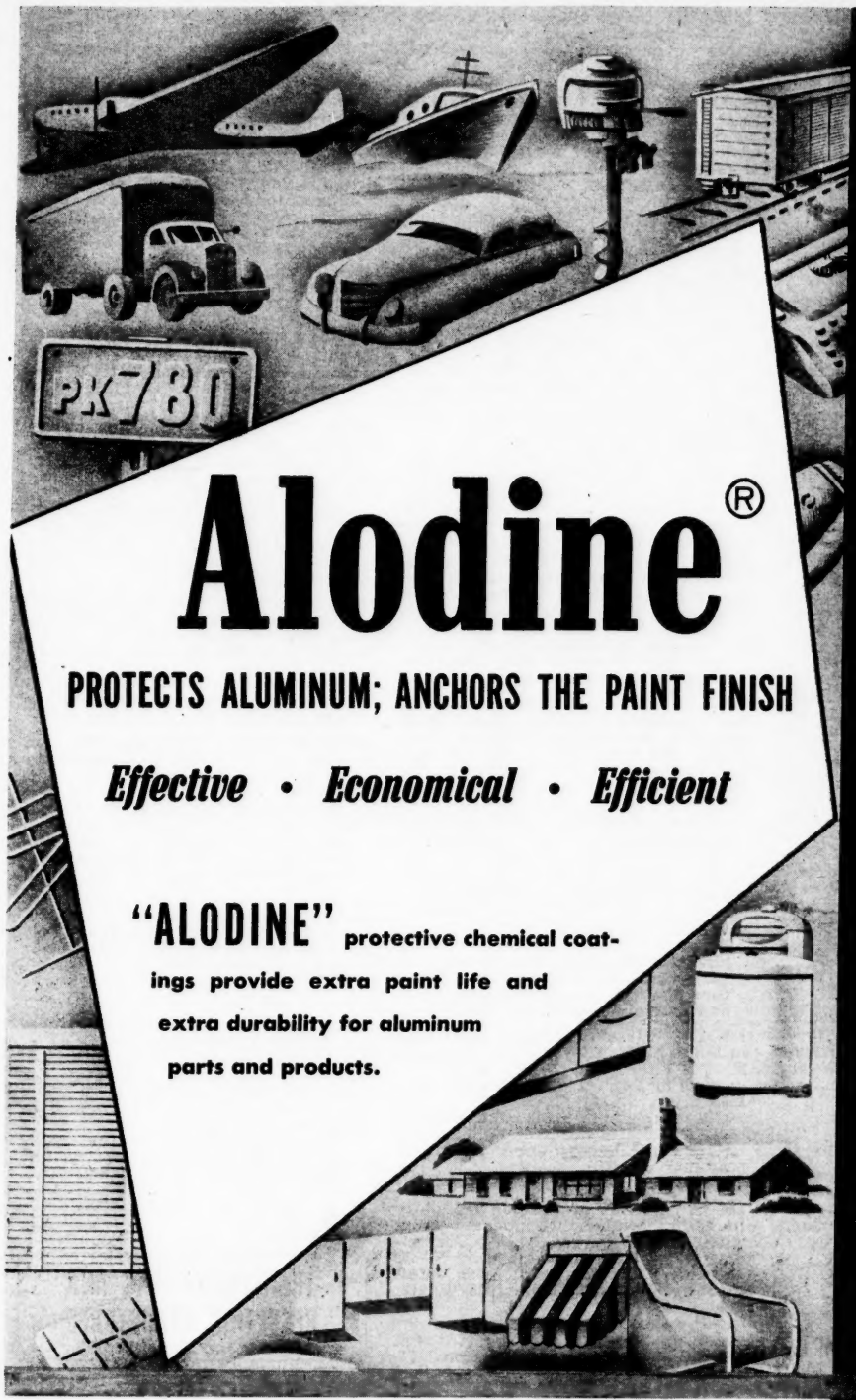
Regenerative crystals added to galvanizing bath serve to maintain fluidity of blanket which in turn effects sharp reduction of dross formation. (L16, Zn)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

119-M. Preparation of Microautoradiographs With the Use of Stripping Film. W. E. Lotz and P. M. Johnston. *Nucleonics,* v. 11, Mar. 1953, p. 54.

Modification of technique to prevent losses during exposure or processing. (M23)



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120-M. The Metallographic Preparation of Borides. R. Wachtell. *Powder Metallurgy Bulletin,* v. 6, Feb. 1953, p. 133-134.

Preparation of transition metal-boride alloys by polishing with fine glass powder. (M21, H general, B)

121-M. (English.) **An X-Ray Study of the Phases in the Silver-Zirconium System.** Nils Karlsson. *Acta Chemica Scandinavica,* v. 6, 1952, p. 1424-1430.

Intermediate phases, structure, and range of Ag-Zr systems. Tables. 10 ref. (M24, Ag, Zr)

122-M. Beryllium-Uranium System. R. W. Buzzard. *Journal of Research of the National Bureau of Standards,* v. 50, Feb. 1953, p. 63-67.

The phase diagram was constructed from data obtained by thermal analysis, metallographic examination, and X-ray diffraction. Micrographs and tables. (M24, Be, U)

123-M. A Camera for Texture Mapping by X-Ray Diffraction. C. J. Milner and J. A. James. *Journal of Scientific Instruments,* v. 30, Mar. 1953, p. 77-83.

Construction and operation of a camera designed to give photographs which are recognizable maps of the reference sphere. Diagrams. (M22)

124-M. Austenite Stability and Creep-Rupture Properties of 18-8 Stainless Steels. Jack K. Y. Hum and Nicholas J. Grant. *Transactions of the American Society for Metals,* v. 45, 1953, p. 105-133.

Two series of simple unstabilized 18-8 Cr-Ni steels were tested, one with C from 0.001 to 0.18 % and the second with N_2 from 0.005 to 0.176 %. Effect of these composition changes on structure, and effect of structure on creep-rupture properties were studied. Tables, graphs, and micrographs. 8 ref. (M27, Q3, SS)

125-M. Microstructure. Cyril Stanley Smith. *Transactions of the American Society for Metals,* v. 45, 1953, p. 533-575.

Topological, geometric, and metric aspects of structure. Shows that principal forms of metallic microstructure can be classified in terms of characteristic properties of the interfaces formed between crystals. Ways in which interfaces respond to forces tending to displace them. Diagrams, graphs, and micrographs. 32 ref. (M27)

126-M. The Zirconium-Nickel Phase Diagram. E. T. Hayes, A. H. Roberson, and O. G. Paasche. *Transactions of the American Society for Metals,* v. 45, 1953, p. 893-900.

Diagram for Zr-rich portion of the Zr-Ni system shows limited solubility of Ni in α-Zr at room temperature. Graphs and micrographs. 8 ref. (M24, Zr, Ni)

127-M. (English.) **X-Ray Line Broadening From Filed Aluminium and Wolfram.** G. K. Williamson and W. H. Hall. *Acta Metallurgica,* v. 1, Jan. 1953, p. 22-31.

Changes in line profile with cold work were correlated with changes in intensity. Shows that some lattice defects such as dislocations must be present in the cold worked state. Differences in apparent strains between the Al and W spectra were interpreted in terms of the instantaneous recovery without necessitating either a different mechanism or dislocation density. Graphs. 42 ref. (M22, Q24, Al, W)

128-M. (French.) **Metallographical Determination of Working Temperatures. Case of 80-20 High-Strength, Heat Resisting Nickel-Chromium Alloys.** Ch. Bückle, P. A. Jacquet, and J. Poulignier. *Revue de Métallurgie,* v. 50, Feb. 1953, p. 105-114; disc., p. 114.

Nondestructive method in which different spots of polished and etched specimens are compared to those of a previously heat treated sample of the same alloy. (M21, Q24, SG-h, Ni)

129-M. (French.) **Autoradiographic Study of Homogenization of Phosphorus and Arsenic Dendritic Segregation in Steels.** A. Kohn. *Revue de Métallurgie,* v. 50, Feb. 1953, p. 139-151; disc., p. 151-152.

Tests were made on five carbon and alloy steel ingots containing 0.10% P and 0.10% As. Micro and macrographs. (M23, N12, N, AY)

130-M. (German.) **Metallography of Light Metals. V.** Hans Kostron and Margarete Schippers. *Metall,* v. 7, Jan. 1953, p. 25-29.

Compares structures of extruded pure Al and Al alloys. Micrographs and diagrams. 10 ref. (M27, Al)

131-M. (German.) **Cu-Fe-S Phase Diagram.** Heinz Schlegel and Arno Schüller. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 421-428.

The Cu-Cu_2S-$CuFeS_2$-$FeS_{1.08}$-Fe system was investigated thermally, optically, and by X-rays. Crystallization processes were determined by melting under increased pressure. Photographs. 22 ref. (M24, Cu, Fe)

132-M. (German.) **On the Lattice Constant and Hardness of the Tungsten Carbide Crystal in Hard Metal Structure.** Hans Pfau and Walter Rix. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 440-443.

X-ray techniques were used to determine lattice tension. (M26, C-n)

133-M. (German.) **Condition and Lattice Constants of Cobalt Alloys With Rhenium, Ruthenium, Osmium, Rhodium, and Iridium.** Werner Köster and Elisabeth Horn. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 444-449.

Shows that Co forms uninterrupted series of solid solutions in its ε and γ forms. Graphs. (M26, Co)

134-M. (Spanish.) **Normality and Abnormality of Steels.** Sebastian Feliu Matas. *Revista de Ciencia Aplicada,* v. 6, May-June 1952, p. 229-234.

Examines the meaning of the above terms and studies various factors influencing the final structure of steels. Includes micrographs and tabular data. 19 ref. (M27)

135-M. Measurements of Clustering in Solid Al-Zn Alloys. P. S. Rudman, P. A. Flinn, and B. L. Averbach. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 365.

Measurements made of the X-ray diffuse scattering from solid solutions of Al containing up to 50 atomic % Zn. Graphs. (M22, Al, Zn)

136-M. Limit of Carbide Solubility in 18-10 Stainless. (Condensed from "Solubility of Carbon in 18% Chromium, 10% Nickel Austenite", by S. J. Rosenberg and Carolyn R. Irish.) *Metal Progress,* v. 63, Mar. 1953, p. 164, 166.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 171-M, 1952. (M26, AY)

137-M. Method for Representing Multi-Component Systems. (Condensation of "Method of Representation of Five-Component and More Complex Metallic Systems", I. I. Kornilov.) *Metal Progress,* v. 63, Mar. 1953, p. 190, 192.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 136-M, 1952. (M24)

138-M. Metallographic and Physical Studies of Temper Brittleness of Alloy Structural Steels. E. Kunze. Henry Brutcher Translation 2978, 6 pages. (From *Stahl und Eisen,* v. 72, no. 22, 1952, p. 1367-1368.)

Results obtained by means of various etchants and electropolishing on Cr-Ni and Cr-Ni-Mo steel specimens in tough and embrittled conditions. Results obtained by the use of X-ray back reflection and microhardness tests on the same specimens. (M27, Q23, AY)

139-M. (English.) **Experimental Verification of the Twin System in Alpha-Iron.** H. W. Paxton. *Acta Metallurgica,* v. 1, Mar. 1953, p. 141-143.

Evaluates the crystallographic elements involved in the mechanical twinning of α-iron. 9 ref. (M26, Q24, Fe)

140-M. (English.) **Some Geometrical Relations in Dislocated Crystals.** J. F. Nye. *Acta Metallurgica,* v. 1, Mar. 1953, p. 153-162.

Theoretical discussion of the average lattice curvatures over large distances as compared with d, the dislocation spacing. Diagrams. (M26)

141-M. (English.) **Inter-Crystalline Fracture and Twinning of Iron at Low Temperatures.** J. R. Low, Jr. and R. G. Feustel. *Acta Metallurgica,* v. 1, Mar. 1953, p. 185-192.

Shows that small amounts of carbon may strongly influence ductility and mode of fracture of iron at low temperatures. Micrographs. 14 ref. (M26, Q23, Fe)

142-M. (English.) **A "Sub-Regular" Solution Model and Its Application to Some Binary Alloy Systems.** H. K. Hardy. *Acta Metallurgica,* v. 1, Mar. 1953, p. 202-209.

Results of testing a mathematical model against a number of binary solid solutions. Graphs. 33 ref. (M24)

143-M. (English.) **The Phase Diagram Section A-BC (Ordered Compound).** H. K. Hardy. *Acta Metallurgica,* v. 1, Mar. 1953, p. 210-217.

Theoretical discussion on the use of a simple statistical mechanical treatment to account for the properties of the Fe-NiAl phase section. Graphs. 18 ref. (M24, Fe, Ni, Al)

144-M. (German.) **X-Ray Investigations in the Ta-Si System.** H. Nowotny, H. Schachner, R. Kieffer, and F. Benesovsky. *Monatshefte für Chemie,* v. 84, no. 1, 1953, p. 1-12.

Physical properties of $Ta_{4.5}\pm_{0.5}$ Si, Ta_5Si, and Ta_5Si_3. (M24, Ta, Si)

145-M. (Book.) **International Tables for X-Ray Crystallography. Vol. I. Symmetry Groups.** Norman F. M. Henry and Kathleen Lonsdale, editors. 558 pages. International Union of Crystallography, Birmingham, England.

Tabulated information for crystal lattices, point-group symmetry, and space-group symmetry. (M26)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

77-N. Decomposition of Austenite in Low Carbon, Ni, Mo, Steel Weld Metal. E. F. Bailey and W. J. Harris, Jr. *Welding Journal,* v. 32, Mar. 1953, p. 134s-138s.

Isothermal decomposition studies including cooling diagrams and microstructures. Micrographs and graphs. (N8, K general, AY)

78-N. Surface Impregnation of Steel With Manganese From a Gaseous Medium. G. N. Dubinin. Henry Brutcher Translation 2943, 9 pages.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 280-N, 1952 (N1, M24, Fe, Mn)

79-N. (German.) **Report on the Question of Crystallization of Cast Iron With Graphite Globules.** A. Wittmoser. *Giesserei,* v. 40, Jan. 8, 1953, p. 8-16.

Theories on formation of graphite globules. Indirect origin from decomposition of cementite, direct origin from the melt, formation from supersaturated mixed crystals, and the influence of C and Si content on their structure. Micrographs. (N12, E25, CI)

80-N. Effects of High-Temperature Heating on the Isothermal Formation of Bainite. S. A. Cottrell and T. Ko. *Journal of the Iron and Steel Institute,* v. 173, Mar. 1953, p. 224-228.

Incubation period is shortened and the rate of transformation is increased in Ni-Cr-Mo steels after austenitizing at high temperature. Graphs and micrographs. 10 ref. (N8, AY)

81-N. Kinetics of the Martensite Transformation Above Room Temperature. G. V. Kurdyumov and O. P. Maksimova. *Metal Progress,* v. 63, Feb. 1953, p. 142, 144.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 105-N, 1952. (N8, AY)

82-N. A Dislocation Mechanism for the Growth of Hopper Crystal Faces and the Growth of Salol Crystals From Solution and From the Melt. S. Amelinckx. *Philosophical Magazine,* v. 44, Mar. 1953, p. 337-339.

Shows how a dislocation mechanism can be devised to account for the occurrence of spiral growth pits. (N12)

83-N. Effect of the Fermi Energy on the Stability of Superlattices. J. F. Nicholas. *Proceedings of the Physical Society,* v. 66, sec. A, Mar. 1953, p. 201-208.

Shows that ordering may cause a significant decrease in the Fermi energy. Application of theory to superlattices in CuPt, CuAu, and Ag_3Mg. 10 ref. (N10)

84-N. A Study of the Order-Disorder Transformation in Iron-Nickel Alloys in the Region $FeNi_3$. R. J. Wakelin and E. L. Yates. *Proceedings of the Physical Society,* v. 66, sec. B, Mar. 1953, p. 221-240.

Transformation was studied by measurements of electrical resistivity, X-ray analysis, and examination of the magnetic properties in both low and high fields. Graphs and tables. 31 ref. (N10, Fe, Ni)

85-N. Effect of Alloying Elements on Grain Boundary Relaxation in Alpha Solid Solutions of Aluminum. C. Dean Starr, E. C. Vicars, A. Goldberg, and J. E. Dorn. *Transactions of the American Society for Metals,* v. 45, 1953, p. 275-285.

Small additions of Zn, Ag, Cu, and Ge that form α solid solutions with Al have no significant effect on resistance to grain-boundary relaxation. Tables and graphs. 4 ref. (N3, Al)

86-N. Effect of Initial Grain Size in the Pearlite-Austenite Transformation. M. I. Maslennikova and Ya. R. Rauzen. Henry Brutcher Translation 2888, 8 pages. (From *Zhurnal Tekhnicheskoi Fiziki,* v. 20, no. 6, 1950, p. 692-697.)

Experimental data obtained on 1.02% C, 1.56% Cr steel. (N8, AY)

87-N. Influence of Manganese Upon Diffusion of Carbon in Austenite. M. E. Blanter. Henry Brutcher Translation 2924, 7 pages. (From *Zhurnal Tekhnicheskoi Fiziki,* v. 21, no. 7, 1951, p. 818-821.)

Experimental study of effect of Mn content, C concentration, and temperature on diffusion constants. (N1, Mn, ST)

88-N. (English.) **Theory of Catalysis of Nucleation by Surface Patches.** David Turnbull. *Acta Metallurgica,* v. 1, Jan. 1953, p. 8-14.

Multiplicity in crystal nucleation frequency is explained by use of no more than two fundamental nucleation frequencies for a given dispersion at a given temperature. Data are described by plausible distributions of patches with size. Graphs. 12 ref. (N2)

89-N. (English.) **Martensite.** F. C. Frank. *Acta Metallurgica,* v. 1, Jan. 1953, p. 15-21.

Investigation in which lattice constants of α and γ phases are given to determine natural habit, motions, and resulting orientation when transformation occurs. Diagrams. 8 ref. (N8, M26, Fe)

90-N. (English.) **Application of Nucleation Theory to Isothermal Martensite.** J. C. Fisher. *Acta Metallurgica,* v. 1, Jan. 1953, p. 32-35.

Previously described extension of classical nucleation theory is shown to agree quantitatively with experimental observations of an Fe-Ni-Mn alloy. Martensite transformation in this alloy is described in terms of nucleation and rapid growth of thin plates. Graphs. (N8, Fe)

91-N. (English.) **Thermal Stabilization of Austenite in Iron-Carbon-Nickel Alloys.** E. R. Morgan and T. Ko. *Acta Metallurgica,* v. 1, Jan. 1953, p. 36-48.

Thermal stabilization of austenite above and below martensitic transformation during cooling and during isothermal holding was investigated. Graphs. 40 ref. (N8, Fe)

92-N. (English.) **Frequency of Annealing Twins in Copper Crystals Grown by Recrystallization.** W. G. Burgers, J. C. Meijs, and T. J. Tiedema. *Acta Metallurgica,* v. 1, Jan. 1953, p. 75-78.

Experiments set up to show that frequency of annealing twins in recrystallized metals depends on orientation between growing crystal and matrix texture. Micrographs. 16 ref. (N5, Cu)

93-N. (French.) **Existence of Carbide Precipitation During the Aging of Fe-C Alloys by Means of Optical and Electronic Micrographs.** H. J. Seemann, D. Hartnagel, and U. Hintzpeter. *Revue de Métallurgie,* v. 50, Feb. 1953, p. 95-104; disc., p. 104.

Observed transformations are compared with kinetics of the carbide precipitation from αFe-C supersaturated solutions. Micrographs. (N7, AY)

94-N. (German.) **Regarding a Series of Solid Solutions Between Two Ternary Representatives of the C1 Type.** L. Castelliz. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, Dec. 15, 1952, p. 1314-1317.

Complete miscibility exists between the two C1 phases, NiMnSb and CuMnSb. Lattice constant increases and Curie temperature decreases with an increase of Cu content. Experimental data are included. (N12, Ni, Cu)

95-N. (German.) **Relationship Between Kinetics of Transformation, Structural Formation, and Hardness of Cr-V Steels.** Max Kroneis, Reinhold Gattringer, and Helmut Krainer. *Stahl und Eisen,* v. 73, Jan. 1, 1953, p. 22-30.

Experiments were conducted on two samples to determine how higher hardening temperatures lead to increased hardening of large cross sections. Micrographs and graphs. 15 ref. (N8, J26, Q29, AY)

96-N. (German.) **On the Age-Hardening of Al-Ag Alloys. Part V. Influencing Electrical Conductivity and Thermal Power by Alternating Heat Treatment in the Cold and Hot Hardening Region.** Werner Köster and Hermann Dietrich. **Part VI. Determination of Heats of Re-Formation and Separation.** Werner Köster and Hans Achim Schell. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 449-459.

Includes graphs. (N7, P15, Al, Ag)

97-N. (Spanish.) **A Practical Case of Retained Austenite.** Mario Pujol Roig. *Revista de Ciencia Aplicada,* v. 6, Mar.-Apr. 1952, p. 130-131.

Retention of austenite in a Cr-Ni carburizing steel after heat treatment. Micrographs. (N8, AY)

98-N. (Spanish.) **Formation of Residual Austenite in a Ni-Cr-Mo Case-Hardened Steel.** Justo Ferrer Flotats. *Revista de Ciencia Aplicada,* v. 6, Mar.-Apr. 1952, p. 132-140.

Underlying causes and various influencing factors. Tables, graphs, and micrographs. 8 ref. (N8, AY)

99-N. Formation of Nodular Graphite in Cast Irons. V. A. Altekar. *Colorado School of Mines, Quarterly,* v. 48, Jan. 1953, p. 1-41.

Proves by logic and experimental evidence that nodular graphite is formed by manipulation of the same factors which cause normal graphitization. Tables and micrographs. Bibliography. (N8, CI)

100-N. Effect of Germanium on the Transformation of White to Gray Tin, at Comparatively Low Temperature. R. R. Rogers and J. F. Fydell. *Electrochemical Society Journal,* v. 100, Apr. 1953, p. 161-164.

At a comparatively low temperature, gray Sn may appear on white Sn when the latter is in contact with elementary Ge, contains a certain proportion of Ge as an alloy, or is in contact with solutions in which certain Ge compounds are dissolved. The spread rate of gray Sn on white Sn castings and coatings containing various proportions of Ge. Tables. (N6, Sn)

101-N. Growth of Metal Whiskers. S. Eloise Koonce and S. M. Arnold. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 365-366.

Study of filamentary growths which may develop on the surfaces of some metals. (N12, Sn)

102-N. The Preferred Direction in a Magnetically Hardened Permanent Magnet Alloy. M. McCaig. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 366.

Investigation in which columnar disks of Alcomax III were cut so that the columnar axis was along a diameter. Results. 6 ref. (N5, P16, SG-n)

103-N. The Phase Transformation of Cobalt as Observed on Single Crystals. Victor J. Kehrer and Henry Leidheiser, Jr. *Journal of Chemical Physics,* v. 21, Mar. 1953, p. 570.

Preliminary results of experiments. (N6, Co)

104-N. Transformation and Hardenability of Boron Steels. *Metal Progress,* v. 63, Mar. 1953, p. 96-B.

Data sheet. (N8, J26, ST)

105-N. Effect of Deformation on Martensite Transformation. A condensation of "Influence of Deformation on the Kinetics of the Martensitic Transformation", by O. P. Maksimova and A. I. Nikonorova. *Metal Progress,* v. 63, Mar. 1953, p. 140, 142.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 104-N, 1952. (N8, AY)

106-N. Alpha and Eta-Phase Formation in Rapidly Cooled Fe-Mn Alloys. J. Gordon Parr. *Metal Treatment and Drop Forgings,* v. 20, Mar. 1953, p. 139-140, 138.

Qualitative theory is given to explain formation of α and ε phases in quenched Fe-Mn alloys in terms of nucleation from strain embryos. Tables. 15 ref. (N6, AY)

107-N. Redistribution of Carbon During Transformation in Bainite Range. L. M. Pevzner, G. M. Rovenskii, and T. D. Kubyshkina. Henry Brutcher Translation 2976, 7 pages. (From *Doklady Akademii Nauk SSSR*, v. 85, no. 4, 1952, p. 811-814.)

Experimental study of carbon content of retained austenite in hypoeutectoid steels after isothermal decomposition in bainite range, based on X-ray measurement of lattice constants. Cr-Mn-Si and 2.7% Si steels were used. (N8, AY)

108-N. (English.) Secondary Recrystallization Textures and Their Origin in Cold-Rolled Single Crystals of Silicon Iron. C. G. Dunn. *Acta Metallurgica*, v. 1, Mar. 1953, p. 163-175.

Study made of changes in grain size and orientation using metallographic, X-ray, and magnetic torque methods. Graphs, diagrams, and micrographs. 16 ref. (N5, Q24, Fe)

109-N. (English.) The Preparation of Alpha-Uranium Crystals. R. W. Cahn. *Acta Metallurgica*, v. 1, Mar. 1953, p. 176-184.

Applications of the strain-anneal and phase-change methods to the growth of alpha-uranium single crystals. Micrographs. 11 ref. (N12)

110-N. (English.) Stress-Induced Movement of Crystal Boundaries. Choh Hsien Li, E. H. Edwards, J. Washburn, and E. R. Parker. *Acta Metallurgica*, v. 1, Mar. 1953, p. 223-229.

Investigations on stress-induced movement of small angle boundaries in Zn crystals in the temperature range of 25 to 400 C°. Graphs and micrographs. (N5, Zn)

111-N. (English.) Anisotropy of Surface Self-Diffusion of Silver. W. C. Winegard. *Acta Metallurgica*, v. 1, Mar. 1953, p. 230.

Measurement of the diffusion and results obtained. (N1, Ag)

112-N. (English.) Notes on the Theory of Annealing Textures. Paul A. Beck. *Acta Metallurgica*, v. 1, Mar. 1953, p. 230-234; disc. p. 234-238.

Shows that the reorientation during annealing can be accounted for on the basis of the orientation dependence of grain boundary mobility. 53 ref. (N5)

113-N. (English.) The Disordering Reaction in Ni_3Pt. R. A. Oriani and T. S. Jones. *Acta Metallurgica*, v. 1, Mar. 1953, p. 243.

Experiments to determine the disordering temperature of Ni_3Pt. (N10, Pt, Ni)

114-N. (Book—Russian.) Phase Transformations in Iron-Carbon Alloys. I. N. Bogachev and A. A. Popov, editors. 174 pages. 1950. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Chapters on crystallization of liquid phases and on diffusion contain fundamental discussions of nucleus formation and crystal growth. Formation and decomposition of austenite; martensite formation, tempering phenomena; and TTT-charts are treated. Isothermal and anisothermal transformation products are compared. (N8, ST)

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P

PHYSICAL PROPERTIES AND TEST METHODS

127-P. Thermodynamic Study of Dilute Solutions of Carbon in Molten Iron. F. D. Richardson and W. E. Dennis. *Transactions of the Faraday Society*, v. 49, Feb. 1953, p. 171-180.

Equilibria between CO + CO_2 gas mixtures and C dissolved in molten iron were measured between 1560 and 1760° C. Results were used for calculating activities, partial molar heats, and entropies. Tables and graphs. 17 ref. (P12, Fe)

128-P. The Adsorption of Oxygen and Other Gases on Copper. R. M. Dell, F. S. Stone, and P. F. Tiley. *Transactions of the Faraday Society*, v. 49, Feb. 1953, p. 195-201.

Effect of heat treatment. Results discussed with reference to Russell's work on poisoning of Cu catalysts. 19 ref. (P13, Cu)

129-P. Magnetic Susceptibility of an Austenitic Steel. Z. A. Sviridova and G. V. Estulin. Henry Brutcher Translation 2961, 5 pages.

Previously abstracted from *Zhurnal Tekhnicheskoi Fiziki*. See item 3-B-18, 1949. (P17, SS)

130-P. (German.) Measurement of Material Constants of Ferromagnetic Substances. Alfons Hersping. *Frequenz*, v. 6, Dec. 1952, p. 345-356.

Measurement of material constants of ferromagnetic metal oxides by concentric coils. Equations are derived. Influence of an air space between sample and circuit, as well as influence of peripheral layers is computed. 13 ref. (P17)

131-P. Dynamic Hysteresis Loops of Several Core Materials Employed in Magnetic Amplifiers. Harold W. Lord. *Communication and Electronics*, Mar. 1953, p. 85-88.

Method used for obtaining loops. Graphs and diagrams. (P16, SG-n)

132-P. Preparation and Reactions of Carbonitrides on Iron. W. Keith Hall, W. E. Dieter, L. J. E. Hofer and Robert B. Anderson. *Journal of the American Chemical Society*, v. 75, Mar. 20, 1953, p. 1442-1447.

Preparation and reactions were studied from 250 to 450°. Compares results with those obtained by Jack. Tables and graphs. 23 ref. (P13, Fe)

133-P. Vapor Pressures of Inorganic Substances. IX. Gallium. Rudolph Speiser and Herrick L. Johnston. *Journal of the American Chemical Society*, v. 75, Mar. 20, 1953, p. 1469-1470.

Vapor pressure was determined by measuring rate of effusion of the vapor through an orifice. Tables. (P12, Ga)

134-P. Theory of the Faradaic Admittance. II. Analysis of the Current-Interrupter Method. David C. Grahame. *Journal of Physical Chemistry*, v. 57, Mar. 1953, p. 257-261.

Theory of current-interrupter method of studying impedance of metal-solution interfaces is examined. Method is outlined to present results of current-interrupter studies in compact form. (P15)

135-P. Charging Processes on Anodic Polarization of Titanium. Colby D. Hall, Jr. and Norman Hackerman. *Journal of Physical Chemistry*, v. 57, Mar. 1953, p. 262-268.

Measurement of cathodic and anodic polarization of Ti. Graphs. 12 ref. (P15, Ti)

136-P. The Effect of Ultrasonic Waves on Hydrogen Overvoltage. Ernest Yeager, T. S. Oey, and Frank Hovorka. *Journal of Physical Chemistry*, v. 57, Mar. 1953, p. 268-275.

Investigation at 300 kc. per sec. in terms of a bright Pt surface. Polarization measurements were made indirectly with an electronic commutator and gated potentiometer. Diagrams. 16 ref. (P15, Pt)

137-P. Electrode Phenomena and the Thermodynamics of Irreversible Processes. Pierre Van Rysselberghe. *Journal of Physical Chemistry*, v. 57, Mar. 1953, p. 275-280.

Concepts of uncompensated heat, power of irreversibility, entropy production, and affinity of irreversible chemical reactions are extended to irreversible electrochemical processes. Concept of power of polarization is introduced and its connection with electrochemical affinity and overvoltage is developed and discussed. 14 ref. (P12, P15)

138-P. Liquid Metals. I. The Viscosity of Mercury Vapor and the Potential Function for Mercury. Leo F. Epstein and Marion D. Powers. *Journal of Physical Chemistry*, v. 57, Mar. 1953, p. 336-341.

Reliable data can be obtained using a Lennard-Jones 6-12 potential. Graphs. 33 ref. (P10, Hg)

139-P. Surface Tension at Elevated Temperatures. I. Furnace and Method for Use of the Sessile Drop Method; Surface Tension of Silicon, Iron, and Nickel. W. D. Kingery and M. Humenik, Jr. *Journal of Physical Chemistry*, v. 57, Mar. 1953, p. 359-363.

Includes graphs, tables, and diagrams. 12 ref. (P10, Fe, Ag, Ni)

140-P. The Exchange Energy of Nearly Free Electrons in Metals. E. P. Wohlfarth. *Philosophical Magazine*, v. 44, Mar. 1953, p. 281-288.

Exchange energy calculations of an assembly of nearly free electrons of low density. Graphs. 11 ref. (P10)

141-P. The Electrical Resistivity of Gold at Very Low Temperatures. A. J. Croft, E. A. Faulkner, J. Hatton, and E. F. W. Seymour. *Philosophical Magazine*, v. 44, Mar. 1953, p. 289-296.

Results for specimens in different states of physical strain down to 0.2° K and for one specimen down to 0.006° K. Diagrams and graphs. (P15, Au)

142-P. Properties of Thermally Treated Germanium. Leo Esaki. *Physical Review*, v. 89, Mar. 1, 1953, p. 1026-1034.

How properties of pure *n* type single crystalline Ge are affected by thermal treatment. Rectification characteristic, resistivity, and Hall coefficient of the specimen were measured. Graphs. 13 ref. (P15, Ge)

143-P. Microwave Observation of the Collision Frequency of Electrons in Germanium. T. S. Benedict and W. Shockley. *Physical Review*, v. 89, Mar. 1, 1953, p. 1152-1153.

Theory for calculation of effective mass and relaxation time. Graphs. (P10, Ge)

144-P. The Hall Coefficient of Calcium. V. Frank and O. Gram Jeppesen. *Physical Review*, v. 89, Mar. 1, 1953, p. 1153-1154.

Experiments and results of measurements. (P15, Ca)

145-P. Mixing of States and Antiferromagnetism. H. P. Hanson. *Physical Review*, v. 89, Mar. 1, 1953, p. 1154.

Discusses theory of superexchange. (P16, Mn)

146-P. The Thermal Conductivity of Superconducting Tin Below 1° K.

B. B. Goodman. *Proceedings of the Physical Society,* v. 66, sec. A, Mar. 1953, p. 217-227.

Describes measurements made on specimens of widely differing purities and compares results. Graphs. 14 ref. (P11, Sn)

147-P. Photoelectric Absorption in Lithium Vapour. J. Tunstead. *Proceedings of the Physical Society,* v. 66, sec. A, Mar. 1953, p. 304.

Tests made of the continuous absorption of light in Li vapor. (P17, Li)

148-P. The Formation of Hydrogen Peroxide on Fresh Metal Surfaces. L. Grunberg. *Proceedings of the Physical Society,* v. 66, sec. B, Mar. 1953, p. 153-161.

The Russell effect, mechanical activation, and Kramer effect on reactivity of freshly formed metal surfaces. 14 ref. (P13, Zn, Al, Mg, Ni)

149-P. Long Wavelength Infrared Photoconductivity of Silicon at Low Temperatures. B. V. Rollin and E. L. Simmons. *Proceedings of the Physical Society,* v. 66, sec. B, Mar. 1953, p. 162-168.

An effect which is believed to be due to excitation of electrons or holes from impurity states. 16 ref. (P17, Si)

150-P. The Saturation Magnetization of Nickel at High Pressure. G. O. Jones and F. D. Stacey. *Proceedings of the Physical Society,* v. 66, sec. B, Mar. 1953, p. 255-256.

Generation of the highest pressures in thin specimens in order to measure magnetic properties under high pressures in high fields. (P16, Ni)

151-P. (English.) **The Solubility of Oxygen in Gamma Iron.** J. A. Kitchener, J. O'M. Bockris, Molly Gleiser, and J. W. Evans. *Acta Metallurgica,* v. 1, Jan. 1953, p. 93-101.

Measurements were made of O_2 uptake from a controlled CO-CO_2 gas mixture by thin strips of high-purity Fe foil heated at 1325-1423° C by means of an electric current. Tables. 18 ref. (P13, Fe)

152-P. (French.) **Study of the Surface Tension of a Grain-Boundary in a Metal as a Function of the Orientation of the Two Grains Which the Boundary Separates.** J. Friedel, B. D. Cullity, and C. Crussard. *Acta Metallurgica,* v. 1, Jan. 1953, p. 79-92.

Interfacial tension between two grains of an Al disk was measured in relative values by classical method of 3-way corner. Suggests new method of calculating interfacial energy. Calculations were carried out for Al, Cu, and α and γ-Fe. Tables and diagrams. 37 ref. (P10, Al, Cu, Fe)

153-P. (French.) **Gamma Radiation of the $Sn^{113}In^{113}$ Transition.** Yvon Deschamps and Paul Avignon. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 236, Feb. 2, 1953, p. 478-480.

Experimental data. (P13, Sn, In)

154-P. (German.) **Theoretical Observations on the Influence of Ferromagnetic Coercive Force by Inclusions of Elliptical Rotational Form in Event That Their Dimensions Are Small as Compared With the Thickness of Block Walls (the Transitional Areas Between Weiss Areas).** Everhard Schwabe. *Annalen der Physik,* v. 11, no. 2-3, 1952, p. 99-112. (P16)

155-P. (German.) **On the Structure of the Ferromagnetic State in α Iron and Certain Iron Alloys.** Gerhard Heber. *Annalen der Physik,* v. 11, no. 2-3, 1952, p. 155-160.

Weaknesses of the Zener theory of magnetization saturation are pointed out. Possible kinds of exchange forces causing the ferromagnetism of the substance. 17 ref. (P16, Fe)

156-P. Thermal Neutron Capture Cross-Section of Na^{23} and Mn^{55}. Rosalie M. Bartholomew, R. C. Hawkings, W. F. Merritt, and L. Yaffe. *Canadian Journal of Chemistry,* v. 31, Mar. 1953, p. 204-206.

Activation method was used. Tables. 8 ref. (P10, Na, Mn)

157-P. Cathodic Lead Disintegration and Hydride Formation. Hugh W. Salzberg. *Electrochemical Society Journal,* v. 100, Apr. 1953, p. 146-151.

Rates of disintegration were studied in solutions of varying pH and salt concentration at different temperatures and current densities. Graphs. (P15, Pb)

158-P. Effect of Local Action Currents on the EMF of the Weston Standard Cell. Herbert H. Uhlig. *Electrochemical Society Journal,* v. 100, Apr. 1953, p. 173-177.

Factors causing drift which decrease observed emf., and ways to construct cells of maximum stability. 17 ref. (P15)

159-P. The Capacity of Polarized Platinum Electrodes in Hydrochloric Acid. W. D. Robertson. *Electrochemical Society Journal,* v. 100, Apr. 1953, p. 194-201.

Electrode capacity of Pt electrodes was measured in HCl by an impedance bridge. Capacity was determined as a function of polarizing voltage, concentration, and frequency. Diagrams and graphs. 17 ref. (P15, Pt)

160-P. Temperature Gradients in Inductively Heated Cylinders. R. J. Thorn and O. C. Simpson. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 297-299.

Method for calculating gradients. (P11, J2)

161-P. Minimum Physical Properties for RWMA Alloys. *Welding Engineer,* v. 38, Apr. 1953, p. 67.

Data sheet for Cu-base and Cu-W alloys. (P general, Q general, K3, Cu)

162-P. (English.) **A New Method for Determining the Heat of Activation for Relaxation Processes.** C. Wert and J. Marx. *Acta Metallurgica,* v. 1, Mar. 1953, p. 113-115.

Shows a straight-line relationship between the heat of activation of a relaxation process and the temperature at which maximum relaxation occurs. Graphs. (P12)

163-P. (English.) **The Energy Stored During the Cold Working of a Gold-Silver Alloy.** M. B. Bever and L. B. Ticknor. *Acta Metallurgica,* v. 1, Mar. 1953, p. 116-122.

Stored energy was determined calorimetrically as the difference in the small heat effects associated with bringing cold worked and annealed samples of the alloy from 0° C. into solution in liquid tin at 240° C. Graphs and tables. 33 ref. (P12, Au, Ag)

164-P. (English.) **Activation Energies and Diffusion Coefficients of Oxygen and Nitrogen in Niobium and Tantalum.** C. Y. Ang. *Acta Metallurgica,* v. 1, Mar. 1953, p. 123-125.

Theoretical diffusion coefficient curves were obtained from the relationship between heats of activation and the calculated diffusion coefficient constants. Graphs. (P12, N1, Cb, Ta)

165-P. (English.) **Thermodynamics of Ordering Alloys. I. Activities in Cobalt-Platinum Alloys and Some General Considerations on Ordering Systems.** R. A. Oriani. *Acta Metallurgica,* v. 1. Mar. 1953, p. 144-152.

In general the distortional, or strain, energy cannot be evaluated from a comparison of the heats of solution of corresponding solid and liquid solutions. Graphs and tables. 41 ref. (P12, N10, Co, Pt)

166-P. (English.) **Thermoelectricity in Metals at Low Temperatures.** D. K. C. MacDonald and W. B. Pearson. *Acta Metallurgica,* v. 1, Mar. 1953, p. 242-243.

Experimental study of thermoelectricity on the alkali metals and Cu, Ag, and Au over a wide temperature range. (P15, Cu, Ag, Au)

167-P. (German.) **Structure and Heat of Formation of Alloys.** U. Dehlinger. *Die Umschau in Wissenschaft und Technik,* v. 53, Feb. 1, 1953, p. 75-76.

Classifies alloys into four structural groups and distinguishes these by linear or parabolic shape of their heats of formation curves. Tables. (P12, M27)

168-P. (Book.) **Heat Transfer Phenomena. The Flow of Heat in Physical Systems.** R. C. L. Bosworth. 211 pages. 1952. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Reviews recent developments in heat transfer and is concerned with conduction of heat in gases; radiative transfer; conduction in solids and liquids; forced and natural convection; heat flow with simultaneous phase change; and use of electrical and other model methods. (P11)

169-P. (Book—Russian.) **Physical Chemistry of Pyrometallurgical Processes. v. I. Reactions Between Gaseous and Solid Phases.** O. A. Esin and P. V. Geld. 510 pages. 1950. Governmental Scientific-Technical Publishing House, Moscow, U.S.S.R.

Divided into sections dealing with fundamentals, thermodynamics, and molecular physics. (P12)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

265-Q. The Peeling Test on Redux-Bonded Joints. A Theoretical Analysis of the Test Devised by Aero Research Limited. C. J. Spies. *Aircraft Engineering,* v. 25, Mar. 1953, p. 64-70.

Analyzes stresses in bonded part of the strip, deformation of the free part, and sensitivity of the peeling test. Graphs and diagrams. (Q25, K12)

266-Q. Elements in the Cause and Cure of Residual Stresses in Cast Iron. L. A. Aldinger. *American Foundryman,* v. 23, Mar. 1953, p. 77-78.

Brief discussion. Micrographs. (Q25, CI)

267-Q. Photoelastic Determination of Stresses in a Cylindrical Shell. H. Fessler and R. T. Rose. *British Journal of Applied Physics,* v. 4, Mar. 1953, p. 76-79.

Frozen stress photo-electric technique was used to determine surface stresses and deformations of a cylinder with flat disk head under internal pressure. Technique of casting, machining, freezing, and slicing of the models. Graphs. 9 ref. (Q25)

268-Q. New Tester Accurately Checks Drawability of Sheet Steel. W. G. Patton. *Iron Age,* v. 171, Mar. 19, 1953, p. 143-145.

Scientific test to determine drawing qualities of flat-rolled stock.

Tester evaluates stretcher strains and detects progressive effects of aging. Graphs and photographs. (Q23, CN)

269-Q. Stress-Cracking of Copper by Mercury. J. Neill Greenwood. *Journal of the Institute of Metals*, v. 81, Mar. 1953; *Bulletin of the Institute of Metals*, v. 1, Mar. 1953, p. 177-178.

Describes tests on Cu subjected to approximately constant rates of tensile strain of 0.2, 40, and 1000% per hr. at room temperature. Micrographs. (Q27, Cu)

270-Q. Aluminum Alloy Family Gets New Quartet. *SAE Jounrnal*, v. 61, Mar. 1953, p. 65-67.

An abridgement of "Today's Aluminum Aircraft Alloys" by J. A. Nock, Jr. Describes new Al alloys and compares mechanical properties. How they can be used for structures, cladding, and rivets. (Q general, T7, T26, Al)

271-Q. Notch Impact Tests of Weld Metal At Low Temperatures. M. Lefevre and J. Lemoine. *Welding Journal*, v. 32, Mar. 1953, p. 122s-124s.

Extended abstract by G. E. Claussen from *Arcos*, Apr. 1952, p. 3171-3189. Transition temperature based on a criterion of minimum energy with a round notch Charpy specimen was determined for weld metal deposited by four different covered electrodes. Graphs. (Q6, K1)

272-Q. On the Problem of the Wear Resistance of Chromized Surfaces. N. S. Gorbunov and V. P. Lazarev. Henry Brutcher Translation 2966, 3 pages.

Previously abstracted from *Doklady Akademii Nauk SSSR*. See item 33-Q, 1953. (Q9, Q29, Fe, Cr)

273-Q. (French.) **Deterioration of Tools Used Under Pressure in the Foundry.** R. Grunberg. *La Métallurgie et la Construction Mécanique*, v. 84, Dec. 1952, p. 923, 925-927.

Pressure and shock of metal; heat shock; chemico-physical action and erosion by liquid metal; and influence of shrinkage. (Q general, E general)

274-Q (French.) **Spreading and Detection of Fatigue Cracks.** R. Cazaud. *Métaux Corrosion-Industries*, v. 27, Dec. 1952, p. 475-485.

Micrographic and radio crystallographic studies were made on crack detection. Rate and direction of cracking are discussed. 19 ref. (Q7)

275-Q. Structural Strength of Thin-Walled Channel Sections. J. M. Harvey. *Engineering*, v. 175, Mar. 6, 1953, p. 291-293.

Theoretical analysis of local instability conditions under flexure in structural sections. Graphs. (Q23)

276-Q. Low-Temperature Test Chamber. *Engineering*, v. 175, Mar. 13, 1953, p. 332-333.

Use of equipment which makes tensile, compression, fatigue, hardness, or impact tests at subzero temperatures. Photographs. (Q general)

277-Q. Temper-Brittleness. A Critical Review of the Literature. B. C. Woodfine. *Journal of the Iron and Steel Institute*, v. 173, Mar. 1953, p. 229-240.

Survey of the published work on temper brittleness up to 1952. Summarizes various theories which have been proposed to explain temper brittleness. Graphs. 77 ref. (Q23)

278-Q. Twisted Square Plate Method and Other Methods for Determining the Shear Stress-Strain Relation of Flat Sheet. Walter Ramberg and James A. Miller. *Journal of Research of the National Bureau of Standards*, v. 50, Feb. 1953, p. 111-123.

Method requires measurements of deflection or extreme fiber bending strain in center portion of a twisted square plate. Examination of alternate methods indicates particular promise for use of an annulus of constant thickness. Al and mild steel were used in the experiments. Diagrams. 17 ref. (Q2, Al, CN)

279-Q. Stress-Strain Relation in Shear From Twisting Test of Annulus. Walter Ramberg and James A. Miller. *Journal of Research of the National Bureau of Standards*, v. 50, Feb. 1953, p. 125-130.

Tests were made on 0.032-in. 75S-T6 Al alloy sheet stressed well beyond the elastic range. Diagrams and photographs. (Q2, Al)

280-Q. Stress Analysis of Circular Frames in a Non-Tapering Fuselage. K. J. Dallison. *Journal of the Royal Aeronautical Society*, v. 57, Mar. 1953, p. 151-176.

Approximate method for analysis of frames using Lagrange's method for minimizing a function of several interdependent variables. Diagrams and graphs. 14 ref. (Q25)

281-Q. How to Evaluate High Temperature Performance of Materials. L. B. Pfeil. *Materials & Methods*, v. 37, Mar. 1953, p. 79-84.

Creep, fatigue, corrosion resistance, and thermal shock as properties to consider in judging materials. Graphs and photographs. 25 ref. (Q3, Q7, R general)

282-Q. Designing With Aluminum. E. J. deRidder. *Modern Metals*, v. 9, Mar. 1953, p. 58-60, 64-65.

How to achieve weight savings with Al at no sacrifice in strength. Diagrams. (Q23, Al)

283-Q. The Effect of Temperature on the Rolling Texture of Plastically Deformed Low Carbon Steel Strip. Norman P. Goss. *Transactions of the American Society for Metals*, v. 45, 1953, p. 333-340; disc., p. 341-343.

Samples were rolled at temperatures from 32 to 800° F. Variables such as number of passes and total reduction were kept constant. X-ray diffraction patterns were taken by the reflection method transverse to the rolling direction. Intensity minima and maxima were measured with a microphotometer. Graphs. 6 ref. (Q24, CN)

284-Q. The Role of Anelasticity in Creep, Tension, and Relaxation Behavior. J. D. Lubahn. *Transactions of the American Society for Metals*, v. 45, 1953, p. 787-838.

Experiments using Cr-Mo-V steel which show that creep recovery exhibits same behavior characteristics as anelastic deformation. Graphs. 11 ref. (Q22, Q3, Q27, AY)

285-Q. (English.) **An Abnormal After-Effect in Metals.** Charles S. Barrett. *Acta Metallurgica*, v. 1, Jan. 1953, p. 2-7.

Experiments showed that single and polycrystalline Fe and Zn wires subjected to plastic flow in torsion generally untwist at a rate such that equal strains occur in equal intervals of log time. Graphs. 18 ref. (Q24, Fe, Zn)

286-Q. (English.) **Plastic Deformation of Alpha-Uranium; Twinning and Slip.** R. W. Cahn. *Acta Metallurgica*, v. 1, Jan. 1953, p. 49-70.

Data on crystallography of twinning, slip, and kinking in α-uranium. Discusses observed intersections of twins and their application to the confirmation of twin directions. Observations are discussed in relation to the crystal structure of U. Atomic motions in twinning are derived graphically. Diagrams and micrographs. 35 ref. (Q24, U)

287-Q. (English.) **A Note on Twinning in Alpha-Uranium.** F. C. Frank. *Acta Metallurgica*, v. 1, Jan. 1953, p. 71-74.

Compares twinning modes of α-uranium with those of Zn. Crystal structures and reciprocal shears and twinning modes. (Q24, U, Zn)

288-Q. (English.) **Similar Glide Processes in Ionic and Metallic Crystals.** P. L. Pratt. *Acta Metallurgica*, v. 1, Jan. 1953, p. 103-104.

Experiments to study plastic deformation of NaCl single crystals. 10 ref. (Q24)

289-Q. (Dutch.) **Effects of Strain in Artificial Aging of Steel.** F. Van Wijk. *Metalen*, v. 8, Jan. 15, 1953, p. 1-4.

Pieces of steel plate were strained 0, 1, 2, 3, 5, and 10% in tension before cutting impact specimens and aging at 250° C. Tests were made at 20, 0, −20, and −40° C. Data are tabulated and charted. 2 ref. (Q6, J27, CN)

290-Q. (French.) **Long-Duration Room-Temperature Tensile Test of Tin Alloy Notched Specimens.** W. Siegfried. *Revue de Métallurgie*, v. 50, Feb. 1953, p. 115-135; disc., p. 135.

Accuracy and advantages. Micrographs, graphs, and tables. (Q27, Sn)

291-Q. (French.) **Study of the Influence of Oxygen-Cutting on Fatigue Strengths of Steel Plate.** H. de Leiris and M. Ballet. *Soudure et Techniques Connexes*, v. 6, Nov.-Dec. 1952, p. 271-279.

Residual stresses caused by oxygen cutting of steel plate were determined. Fatigue data and specimen structures are included. (Q25, Q7, G22, ST)

292-Q. (German.) **Friction, Friction Oxidation, and Fatigue Cracking of Metals.** W. Spath. *Metall*, v. 7, Jan. 1953, p. 34-36.

If two metallic surfaces are moved against one another under pressure, high local temperature occurs which can momentarily reach the melting temperature of the metals. Friction oxidation is signified by galling of local areas and subsequent shearing. Fatigue cracking is explained by combined effect of destructive "melting-off process" and healing of welds. (Q7, Q9)

293-Q. (German.) **Change of the Mechanical Physical Properties of Ag-Cu Alloys by Addition of Phosphorus.** F. Lihl and J. Bengough. *Metall*, v. 7, Feb. 1953, p. 103-106.

Properties of Ag-rich Ag-Cu-P alloys were tested. Addition of P favored increased hardness, elasticity, and plastic deformation but showed no increase in electrical conductivity. Photographs, tables, and graphs. (Q general, P15, Ag, Cu)

294-Q. (German.) **Experiences With Additions of Boron to Structural Steel Alloys.** Helmut Krainer and Max Kroneis. *Stahl und Eisen*, v. 72, Dec. 18, 1952, p. 1652-1657.

Influence of B on hardenability and hardness properties was tested for various structural steels. Graphs and micrographs. 13 ref. (Q29, J26, AY)

295-Q. (German.) **Electron Microscopic Investigation of the Surface of Strained Super Pure Aluminum. Parts II and III.** Heinz Wilsdorf and Doris Kuhlmann-Wilsdorf. *Zeitschrift für Angewandte Physik*, v. 4, Nov. 1952, p. 409-424.

Discusses a number of disturbances and effects of plastic deformation. All cross-slip lines observed belong to the (111) system. Measurement of thickness and average slip of lamina in cross slips is emphasized. (Q24, Al)

296-Q. (German.) **Processes in Stressed and Alternatingly Stressed Metallic Structures. Part IV. Internal Notch Effect and Surface Sensitivity With an Alternating Bending**

Load. Cord Petersen. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 429-433.

Quantitative standards are set up for a general theory on the effects of internal notches in cast steel, cast iron, and hardened steels. Surface sensitivity in bending and internal notches are shown to be similar phenomena. (Q5, ST, CI)

297-Q. A Preliminary Study of the Ductility of Chromium. H. B. Goodwin, R. A. Gilbert, C. M. Schwartz, and C. T. Greenidge. *Electrochemical Society Journal,* v. 100, Apr. 1953, p. 152-160.

Chromium was found to be cold ductile if it is sufficiently pure and if low strain rates are used. Slip mechanism was confirmed by X-ray and microscopic techniques. Micrographs. 9 ref. (Q23, Cr)

298-Q. Effect of Low and High Temperatures on Physical Properties and Machinability of Carbon Steels. F. Bögner. (Translated and condensed from *Die Technik,* v. 7, Nov. 1952, p. 667-672.) *Engineers' Digest,* v. 14, Mar. 1953, p. 87-90.

Effect of temperature on mechanical properties of materials and machinability criteria. (Q general, G17, CN)

299-Q. Surface Effects and the Creep of Zinc Single Crystals. I. Creep Characteristics of Clean and Oxide-Coated Crystals. Frances Dunkle Coffin and Andrew L. Weiman. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 282-289.

Quantitative studies of the influence of surface composition on creep under constant loads. Graphs and tables. 12 ref. (Q3, Zn)

300-Q. Elasticity and Thermal Expansion of Germanium Between −195 and 275° C. Morris E. Fine. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 338-340.

Calculations of the elastic parameters, compressibility, and Poisson's ratio. Graphs. 12 ref. (Q21, P11, Ge)

301-Q. Limiting Conditions for Jet Formation in High Velocity Collisions. J. M. Walsh, R. G. Shreffler, and F. J. Willig. *Journal of Applied Physics,* v. 24, Mar. 1953, p. 349-359.

Discusses high-velocity collision of two solids as a problem in compressible fluid hydrodynamics. Presents a theory which describes flow in the collision region for the jetless case and determines a critical collision angle above which a jet must arise from the collision. Graphs, diagrams, and photographs. (Q general, CN, Cu, Pb)

302-Q. Magnesium Casting Alloys Containing Zirconium. F. P. Strieter. *Metal Progress,* v. 63, Mar. 1953, p. 75-82.

Physical and mechanical properties of Mg-rare earth-Zr, Mg-Th-Zr, and Mg-Zn-Zr systems. Graphs and tables. (Q general, Mg)

303-Q. Some Metallurgical Characteristics of Medium-Carbon Boron-Treated Steels. Robert N. Imhoff and James W. Poynter. *Metal Progress,* v. 63, Mar. 1953, p. 97-104.

Tests for quenching temperature, hardenability, tensile properties, notched tensile strength, notched impact values, temper brittleness, and fractures. Tables and graphs. (Q general, J26, AY)

304-Q. Fatigue Properties of Springs as Affected by Heat Treatment. R. L. Rickett and A. O. Mason. *Metal Progress,* v. 63, Mar. 1953, p. 107-110.

Fatigue test procedure and test results on austempered and quenched and tempered springs. Graphs and tables. (Q7, J26, SG-b)

305-Q. A Linear Time-Temperature Relation for Extrapolation of Creep and Stress-Rupture Data. S. S. Manson and A. M. Haferd. *National Advisory Committee for Aeronautics,* Technical Note 2890, Mar. 1953, 49 pages.

Sources of discrepancy from the use of $(T+460)(20+\log+,)$ parameter and proposes use of two newly derived material constants. Graphs. (Q3, Q4)

306-Q. Effect of Processing Variables on the Transition Temperature, Strength, and Ductility of High-Purity, Sintered, Wrought Molybdenum Metal. Kenneth C. Dike and Roger A. Long. *National Advisory Committee for Aeronautics,* Technical Note 2915, Mar. 1953, 26 pages.

Emphasizes amount of swaging, recrystallization, and stress-relieving. (Q23, F25, N5, J1, Mo)

307-Q. A Wear-Resisting Iron. *Overseas Engineer,* v. 26, Apr. 1953, p. 298-299.

Applications for C. Y. alloy which has a homogeneous, tough structure with high anti-abrasion properties. Photographs. (Q9, T general, CI)

308-Q. Creep Testing in Compression for Simple Creep Assessment. A. H. Sully. *Product Engineering,* v. 24, Apr. 1953, p. 150-153.

Apparatus and correlation between compressive and tensile creep. (Q3)

309-Q. Improving Fatigue Resistance of Bolted Joints. J. P. Vidosic. *Product Engineering,* v. 24, Apr. 1953, p. 190-191.

Tabulated information. (Q7, K13)

310-Q. Using SR-4 Gages to Measure Strains in Wire Strand. A. Smislova, A. C. Loewer, Jr., and W. J. Eney. *Product Engineering,* v. 24, Apr. 1953, p. 214.

Briefly describes technique. (Q25)

311-Q. Critical Buckling Shear Stresses in Thin Cylinders. J. J. Eden. *Product Engineering,* v. 24, Apr. 1953, p. 225, 227.

Mathematical interpretation. Nomographs. (Q2)

312-Q. A Machine for Tensile Testing at Controlled Temperatures and Constant True Strain Rates. E. L. Bartholomew, Jr., K. J. Krystyan, D. A. J. Millar, and J. Wulff. *Review of Scientific Instruments,* v. 24, Mar. 1953, p. 196-202.

Details of construction and operation of the equipment. Information obtainable is valuable in hot working research and complements that available from creep and stress-rupture tests. Diagrams and graphs. (Q27)

313-Q. Hardness and Hardenability. Howard E. Boyer. *Steel Processing,* v. 39, Feb. 1953, p. 78-82.

Defines and explains both terms. (Q29, J26)

314-Q. On the Physical Nature of Fatigue. L. A. Glikman and V. P. Tekht. Henry Brutcher Translation 2983, 4 pages. (From *Doklady Akademii Nauk SSSR,* v. 86, no. 4, 1952, p. 699-701.)

Experimental study based on mechanical tests and X-ray investigation. Changes in fatigue strength and X-ray pattern of medium carbon and 14% Cr stainless steel upon repeated cyclic stressing above and below the fatigue limit, with and without subsequent aging or high tempering. (Q7, CN, SS)

315-Q. (English.) Yield Points in Aluminium Alloy Single Crystals. R. E. Smallman, G. K. Williamson, and G. Ardley. *Acta Metallurgica,* v. 1, Mar. 1953, p. 126-130.

Experiments were made to compare tensile behavior of some Al alloy single crystals which contained Cu, Zn, or H_2, with that of superpure Al crystals. Graphs. 22 ref. (Q27, Al, Cu, Zn)

316-Q. (English.) Anelastic Measurement of Atomic Mobility Under Non-Equilibrium Conditions. A. S. Nowick and R. J. Sladek. *Acta Metallurgica,* v. 1, Mar. 1953, p. 131-140.

Anelastic method is used to measure mobility in Ag-Zn alloys after quenching-in an excess of vacancies. Graphs. 13 ref. (Q22, M25, Ag, Zn)

317-Q. (English.) The Internal Friction of Tantalum and Columbium Foils at Ultrasonic Frequencies. J. W. Marx, G. S. Baker, and J. M. Sivertsen. *Acta Metallurgica,* v. 1, Mar. 1953, p. 193-201.

Tests for determining temperature dependence of the internal friction of polycrystalline Ta and Cb foils. Graphs and diagrams. 20 ref. (Q22, Ta, Cb)

318-Q. (English.) The Movement of Twins, Kinks, and Mosaic Walls in Zinc. P. L. Pratt and S. F. Pugh. *Acta Metallurgica,* v. 1, Mar. 1953, p. 218-222.

Movement under stress of kink planes and curved mosaic walls in terms of their dislocation content. Micrographs. 9 ref. (Q24, Zn)

319-Q. (English.) Textures in Extruded Aluminium. K. V. Gow and R. W. Cahn. *Acta Metallurgica,* v. 1, Mar. 1953, p. 238-241.

Shows that the preferred orientation of nuclei must aid in determining the final texture. Diagrams. (Q24)

320-Q. The Theory of Indentation and Hardness Tests. R. F. Bishop, R. Hill, and N. F. Mott. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 1-16.

Indentation of ductile materials by cylindrical punches with conical heads. Experiments made with work hardened and with annealed Cu, for penetrations up to nine times the diameter of the punch. Graphs. (Q29, Cu)

321-Q. The Theory of Wedge Indentation of Ductile Materials. R. Hill, E. H. Lee, and S. J. Tupper. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 17-35.

Theoretical solution for the deformation produced by a rigid frictionless wedge penetrating a plastic material. Theory is compared with results of experiments on Pb blocks indented by steel wedges coated with Vaseline. Diagrams and photographs. (Q25, Pb)

322-Q. The Theory of Wedge Penetration at Oblique Incidence and Its Application to the Calculation of Forces on a Yawed Shot Impacting on Armour Plate at Any Angle. R. Hill and E. H. Lee. "Strength & Testing of Materials". v. 6, Part I. Theoretical Papers on Strength and Deformation. 1952. p. 36-46.

Methods and applications. Tables and diagrams. (Q25)

323-Q. The Theory of Combined Plastic and Elastic Deformation with Particular Reference to the Deformation of a Thick Tube Under Internal Pressure. E. H. Lee, R. Hill, and S. J. Tupper. "Strength & Testing of Materials". v. 6, Part I Theoretical Papers on Strength and Deformation. 1952. p. 47-76.

Reviews theory of the deformation of a material under combined stresses, which involves both elastic and plastic components of strain. Applications of theory. Diagrams and graphs. (Q24)

324-Q. The Theory of the Autofrettage of a Closed-End Tube. R. Hill, E. H. Lee, and S. J. Tupper. "Strength & Testing of Materials". v. 6. Part I, Theoretical Papers on Strength and Deformation. 1952. p. 77-87.

As plastic flow develops, longitudinal strain increases toward a limit which is very nearly attained not long after the whole tube is entirely plastic. Conventional treatment is found to be more accurate for a closed-end condition than it is when longitudinal strain is prevented. Graphs. (Q24)

325-Q. A Method of Numerical Solution of the General Plane Plastic Problem, and Its Application to the Compression of a Ductile Material Between Rough Plates. R. Hill, E. H. Lee, and S. J. Tupper. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 88-104.

Procedures and results. Diagrams and graphs. (Q28)

326-Q. Notch Brittleness and Ductile Fracture in Metals. E. Orowan, J. F. Nye, and W. J. Cairns. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 127-176.

Cause of notch brittleness according to the Ludwik-Davidenkov theory. X-ray investigations show that it may also arise in an entirely different way and that, in ductile carbon steels, the upper yield point can rise considerably above its value under uniformly distributed stress. Graphs, diagrams, and tables. 38 ref. (Q23)

327-Q. The Two-Dimensional Theory of Plastic Yielding of Deeply-Notched Bars in Tension. R. Hill. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 177-190.

Analysis of stress distribution in the core of a notched bar under tension at stage when bar is about to yield. Results obtained are roughly of the same magnitude as those found experimentally for round bars. Diagrams. (Q27)

328-Q. A Theoretical Analysis of the Stresses and Strains in Wire-Drawing. R. Hill and S. J. Tupper. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 205-224.

Proposes new theory to describe stress distribution in a wire drawn through a die. Shape of plastic region is determined by considering the associated strain configuration. Diagrams and graphs. 13 ref. (Q25, F28)

329-Q. General Methods of Solution of the Axially Symmetric Problem in Plasticity. R. Hill. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 225-246.

Various methods for solving axially symmetric problems in the plastic flow of metals under large strains. Applications to necking of a tensile specimen, wiredrawing, triaxial stresses in a tube, and indentation by a flat punch. 8 ref. (Q24)

330-Q. A Theory of the Yielding and Plastic Flow of Anisotropic Metals. R. Hill. "Strength & Testing of Materials". v. 6. Part I. Theoretical Papers on Strength and Deformation. 1952. p. 247-260.

Application of theory to experiments on necking under uniaxial tension of flat bars cut from rolled sheet. Diagrams. 8 ref. (Q24, Q27)

331-Q. A Nomographic Solution of a Stress Problem. D. E. Thomas. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 1-6.

Complete determination of stress involves the determination of the magnitude and direction of the principal stresses. Method of solving the equations involved. (Q25)

332-Q. Measurement of Stress by X-Rays. D. E. Thomas. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 7-18.

Direct and oblique back-reflection; effects of stress on back-reflection; detection of circumferential and radial stresses in a ring; and determination of elastic constants. Graphs and photographs. 9 ref. (Q25)

333-Q. The Relationship Between Required Test Factors and Strength Variation. R. D. Starkley and D. R. Cox. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 19-30.

Probability curves from which the test factor corresponding to any given scatter and level of probability may be found. Method of using the curves and some of their applications. Graphs. (Q23, S12)

334-Q. The Relationship Between Required Test Factors and Strength Variation in the Case of Two Types of Failure. D. R. Cox. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 31-38.

Methods, calculations, and conclusions. Graphs. (Q23)

335-Q. The Effect of Skewness of the Frequency Distribution on the Relationship Between Required Test Factors and Strength Variation. D. R. Cox. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 39-49.

Investigation of theory and applications. Graphs. (Q23)

336-Q. Mechanical Methods of Measuring Internal Stress. Split Ring Method as Applied to a Cold Drawn Cylindrical Cup. A. Knight and H. E. Morgan. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 50-60.

Methods and tests. Graphs, tables, and photographs. (Q25)

337-Q. Bearing Tests on Tube, Bar, and Sheet Materials. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 61-120.

Tests carried out on typical joints. Test pieces were designed so that the average tensile and shear stresses in the material around the holes were small in comparison with the average bearing stresses. Graphs, tables, and photographs. (Q23)

338-Q. Investigation of Butt-Welds in Low-Carbon Steel Tubes". "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952, p. 125-139.

Investigation of fatigue strength under alternating bending stress, and static tensile strength of butt welded tubes not subsequently heat treated, and of welded tubes which were blued and normalized after being welded. Graphs, tables, and micrographs. (Q7, K9, CN)

339-Q. Investigations of Butt-Welds in Low-Carbon Low-Manganese Steel. J. M. Robertson and C. W. George. "Strength & Testing of Materials". v. 6, Part II. Testing Methods and Test Results. 1952. p. 140-153.

Tensile and fatigue tests on tubes in the "as-received" condition and after butt welding at midlength by oxy-acetylene torch, the welds having been made with iron wire as filler rod. Graphs and tables. (Q27, Q7, CN)

340-Q. Investigation of Butt-Welds in Chromium-Molybdenum Steel. H. J. Hipkins and W. J. Taylor. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 154-175.

Effect of building up an oxy-acetylene butt-weld in tubing to increase the diameter by 0.04 in. Effects of three heat treatments applied after the welding operation. Graphs, tables, and micrographs. (Q general,-K2, J1, AY)

341-Q. The Mechanical Properties of Butt-Welded Joints in Chromium-Molybdenum Steel Tubing, D.T.D. 178. M. S. Fisher and J. T. Ballett. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 176-188.

Tensile tests and rotating-beam fatigue tests made on tubing as received and with the outer surface ground smooth. Gaswelded butt joints were tested as-welded and with the external reinforcement machined off. Tables. (Q27, Q7, K2, AY)

342-Q. Strength Requirements for Spot Welds. D. R. Cox, P. E. Montagnon, and R. D. Starkey. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 189-200.

Failure rates for spot welded joints. Test factors that should be required are estimated. Graphs. (Q27, K3)

343-Q. Investigation of the Effect of Welding on the Mechanical Properties of Low-Carbon Manganese-Molybdenum Steel Tubing (D.T.D. 347). M. S. Fisher. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 201-206.

Test data on effect of simple heat treatment; oxy-acetylene and metallic-arc welding, and heat treatment after welding on tensile properties and fatigue strength. (Q27, Q7, K1, K2, AY)

344-Q. The Transformation of Components of Stress and Strain in Two-Dimensional Elasticity. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 207-211.

Transformation from one system of coordinate axes to another is given by two equations. (Q21)

345-Q. The Distribution of Stress in a Decelerating Elastic Sphere. W. R. Dean, I. M. Sneddon, and H. W. Parsons. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 212-234.

Analysis of distribution of stress in a solid elastic sphere due to the application of a uniform hydrostatic pressure to part of the surface. Numerical example shows variation of stress throughout the sphere. Other comparative cases are treated. Graphs and tables. (Q25, Q21)

346-Q. Distribution of Stress in the Vicinity of a Spherical Inclusion. B. F. Middleton. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test Results. 1952. p. 235-243.

Expressions for the components of stress and displacement at a point near an inclusion embedded in a bar of material subjected to a uniform tensile stress. Results are used to determine a formula for Young's modulus of an alloy, the included particles representing a second phase. (Q21)

347-Q. (Book.) **Strength & Testing of Materials.** v. 6. Part I. Theoretical Papers on Strength and Deformation. Part II. Testing Methods and Test Results. 504 pages. 1952. Her Majesty's Stationery Office, York House, Kingsway, London, W.C. 2. American distributor, British Information Service, 30 Rockefeller Plaza, New York 20, N. Y.

Consists of 30 papers abstracted separately. (Q general)

R

CORROSION

140-R. Stainless Steel—Properties of Material. H. R. Dalziel. *Australasian Engineer,* Jan. 7, 1953, p. 53-58.

Physical, mechanical, and corrosion resisting properties which are of interest to chemical and welding engineers. Tables. (R general, Q general, SS)

141-R. Lead Cyanamide. Use in Anti-Rust Paints. H. Zirngibl. *Iron & Steel,* v. 26, Mar. 1953, p. 101-105. (Translated from *Fette und Seifen,* v. 53, p. 740-746.)

Analyzes Pb cyanamide to determine effectiveness for preventing corrosion. Micrographs and photographs. (R10, L26)

142-R. The Role of Tannates and Phosphates in the Preservation of Ancient Buried Iron Objects. T. W. Farrer, L. Biek, and F. Wormwell. *Journal of Applied Chemistry,* v. 3, Feb. 1953, p. 86-96.

The lack of corrosion was due mainly to inhibition of the activity of sulphate-reducing bacteria by tannates present in the soil. Photographs and tables. (R10, Fe)

143-R. The Effect of Climate and Atmospheric Pollution on Corrosion. J. C. Hudson and J. F. Stanners. *Journal of Applied Chemistry,* v. 3, Feb. 1953, p. 86-96.

Results of routine observations on the corrosion of small specimens of ingot iron and Zn. Tabulates data which relate to 20 separate annual tests. Graphs and tables. (R3)

144-R. How to Combat Erosion in Fluid Cat Cracker. J. S. Clarke. *Oil and Gas Journal,* v. 51, Mar. 23, 1953, p. 262-264, 268-269, 272, 276.

Program to discover factors involved in erosion. Slide-valve and grid erosion, cyclones, overhead lines, and water sprays. Diagrams and photographs. (R1)

145-R. Effect of Hydrogen Sulphide Upon Turbine Blades. A Splittgerber. Henry Brutcher Translation 2909, 7 pages. (From *Vom Wasser,* v. 17, 1949, p. 140-145.)

Causes of stress-corrosion cracks in blades of 5% Ni and other steels. Experimental data and results. (R1, AY, SS)

146-R. Effect of Various Alloying Elements on the Properties of Cast Iron, Particularly on Thermal Stability. H. Timmerbeil. Henry Brutcher Translation 2914, 10 pages.

Previously abstracted from *Giesserei.* See item 163-R, 1951. (R2, E25, CI)

147-R. Role Played by Nitrogen in High-Temperature Oxidation of Titanium in Air. V. I. Arkharov and G. P. Luchkin. Henry Brutcher Translation 2921, 8 pages.

Previously asbstracted from *Doklady Akademii Nauk SSSR.* See item 360-R, 1952. (R2, Ti)

148-R. Dissolution of Steel in Sulfuric Acid Under the Influence of Ultrasound. A. P. Kapustin and M. A. Fomina. Henry Brutcher Translation 2944, 5 pages.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 361-R, 1952. (R5, ST)

149-R. Influence of Composition of Stainless Steels Upon Resistance to Sulfuric and Hydrochloric Acids. K. Bungardt and H. J. Rocha. Henry Brutcher Translation 2963, 8 pages.

Previously abstracted from *Werkstoffe und Korrosion.* See item 301-R, 1952. (R5, SS)

150-R. Making and Using Glassed Steel Vessels. *Canadian Chemical Processing,* v. 37, Mar. 1953, p. 54, 56, 58.

Construction details and corrosion resistance data. (R general, L27, ST)

151-R. Corrosion of Materials by Liquid Low Melting Alloys. *Materials & Methods,* v. 37, Mar. 1953, p. 131.

Tabulated information includes ferrous and nonferrous metals and nonmetals. (R6)

152-R. How You Can Fight Corrosion. Allen G. Gray. *Steel,* v. 132, Apr. 6, 1953, p. 102-106, 108.

Factors involved in corrosion, and utilization of available means of combating it. Photographs. (R general)

153-R. (German.) **The Prevention of Corrosion by Dehydration of the Atmosphere.** Heinrich Netz. *Werkstoffe und Korrosion,* v. 4, Jan. 1953, p. 2-4.

Basic theoretical principles and some practical applications. Numerical problems were solved by the use of an i-x diagram for moist air. (R3)

154-R. (German.) **Influence of Impurities on Corrosion Resistance of Aluminum and Its Alloys.** Erich Franke. *Werkstoffe und Korrosion,* v. 4, Jan. 1953, p. 4-14.

Influence was determined by the type of corrosive medium. Frequently the failure of Al was due to service or other conditions rather than to impurities. (R general, Al)

155-R. (German.) **On Potential Variations of Aluminum. Part II. Theoretical Consideration.** Georg Masing and Dietrich Altenpohl. *Zeitschrift für Metallkunde,* v. 43, Dec. 1952, p. 433-439.

Electrochemical potential of Al shows irregular, brief variations in salt solution. Microscopic investigation of the corroded surface showed that potential changes are result of H_2 blisters. Diagrams. (R11, Al)

156-R. Bacterial Attack on Buried Piping Regarded as Serious Cause of Rapid Corrosion. (concluded). Carl G. Dueber. *American Gas Journal,* v. 178, Mar. 1953, p. 23, 40.

Methods for detecting bacterial corrosion. (R1, CN)

157-R. Fighting Underground Corrosion at the New Fairless Works. How Piping and Other Services are Protected. William E. Coleman and Harold G. Frostick. *Heating, Piping, & Air Conditioning,* v. 25, Apr. 1953, p. 85-87.

Features of the system are elimination of bare Cu underground, Mg anodes, insulating coverings, and design of ground bed installations. (R8, Cu, Mg, ST, Pb)

158-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 45, Apr. 1953, p. 93A-95A.

Use of Cu, which shows good corrosion resistance to H_2SO_4 under nonoxidizing conditions. Graphs and tables. (R5, Cu)

159-R. Embrittlement of Zirconium and Tantalum in Hydrochloric Acid. Lex B. Golden, I. Roy Lane, Jr., and Walter L. Acherman. *Industrial and Engineering Chemistry,* v. 45, Apr. 1953, p. 782-786.

Results obtained with Zr, Zr alloys, and Ta exposed to the corrosive action of concentrated HCl. Graphs and tables. 15 ref. (R5, Zr, Ta)

160-R. Here's What's Happening in Combating Corrosion in Oil and Gas Wells. Gerald L. Farrar. *Oil and Gas Journal,* v. 51, Apr. 1953, p. 106-109, 111, 113.

Reviews reports on combating corrosion in sweet-oil wells and in oil-well casing. Considers inhibitors in condensate wells. (R7)

161-R. Corrosion Control in Cooling Water Systems. W. A. Tanzola. *Petroleum Engineer,* v. 25, Apr. 1953, p. C57-C60.

Factors which interfere in water treatment. Combination methods have solved many problems. Graphs and tables. (R4)

162-R. Gasification of Lignite in a Commercial-Scale Pilot Plant. Progress Report for 1947-48. A. C. Burr, J. C. Holtz, A. W. Koth, and W. H. Oppelt. *U. S. Bureau of Mines,* Report of Investigations 4940, Feb. 1953, 28 pages.

Useful life of outer metal retort tube as influenced by corrosion under a wide range of operating conditions. Gas generation with high ratio of H_2 to CO in both divided and continuous annuli. (R9, B15, AY)

163-R. (German.) **Precious Metal Alloys of Particularly High Resistance Against Strong Mineral Acids.** J. Schatz. *Chemie Ingenieur Technik,* v. 25, Feb. 1953, p. 61-65.

Corrosion resistant Pt and Au alloys. Test results on Au-Ag-Pd alloys in HCl. (R5, Au, Ag, Pd, Pt)

164-R. (Book.) **Oxidation of Metals and Alloys.** O. Kubaschewski and B. E. Hopkins. Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y. $6.00. Also Butterworths Scientific Publications, Bell Yard, Temple Bar, E.C.2, England. 35s. net.

After background information on oxidation, there are sections on experimental methods, special theories concerning different types of oxidation, and experimental results relating to the rate of oxidation of various metals and alloys. (R2)

S

INSPECTION AND CONTROL

105-S. Quality Control Aids in Steel Processing Control. Wade R. Weaver. *Blast Furnace and Steel Plant,* v. 41, Feb. 1953, p. 198-202, 223; Mar. 1953, p. 307-310.

Statistical techniques serve as an added tool to operations analyst. Process of setting up controls to reduce variations in ingot weight and quality. Graphs. (S12)

106-S. The Principles of Technical Control in Metallurgical Manufacture. A. R. E. Singer. *Journal of the Institute of Metals,* v. 81, Mar. 1953, p. 329-340.

Effects of economic and technical factors on the quality of manufactured products. Some aspects of statistical plant control in relation to present practice and probable future developments. Diagrams, graphs, and tables. (S12)

107-S. The Techniques, Applications, and Scope of Non-Destructive Testing in Industry. J. D. Hislop. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 69, Mar. 1953, p. 225-244.

Main methods of nondestructive

testing (radiography, magnetic crack tection, ultrasonics, etc.); their scope and limitations. Economics of testing. Photographs. (S13)

108-S. Determination of Small Percentages of Boron in Heat Resisting Alloys and Alloy Steels. A. G. Komarovskii. Henry Brutcher Translation 2962, 6 pages. (From *Zavodskaia Laboratoriia*, v. 16, no. 10, 1950, p. 1228-1230.)

Quantitative spectrographic method. Procedure for preparing standards and specimens. (S11, B, AY)

109-S. Ultrasonic Testing of Heavy Steel Forgings by the Pulse-Echo Technique. R. Schinn and U. Wolff. Henry Brutcher Translation 2964, 17 pages.

Previously abstracted from *Stahl und Eisen*. See item 352-S, 1952. (S13, ST)

110-S. Gas-Sampling Equipment for the Supervision of the Working of the Blast Furnace. W. Loorz. Henry Brutcher Translation 2998, 8 pages.

Previously abstracted from *Stahl und Eisen*. See item 548-S, 1952. (S11, D1, Fe)

111-S. (French.) **Simultaneous Determination of Iron and Aluminum in Zinc for Galvanizing.** V. H. Hardy. *Métaux Corrosion-Industries*, v. 27, Dec. 1952, p. 515-518.

Describes a spectro-photometric method. Tables and graphs. (S11, L16, Fe, Al, Zn)

112-S. Volumetric Determination of Aluminum in Copper-Base Alloys by Fluoride Method. Jorma Kinnumen and Bengt Merikanto. *Chemist Analyst*, v. 42, Mar. 1953, p. 16-17.

Procedure and results. (S11, Al, Cu)

113-S. Lowered Production Costs Through the Use of Dy-Chek or Spek-Chek. Gordon Rice. *Nondestructive Testing*, v. 11, Mar. 1953, p. 16-22.

Development, field performance, evaluation, and use in inspection. Photographs. (S13)

114-S. The Brown Boveri 31-Million Volt Dual Beam Betatrom. R. Wideroe. *Nondestructive Testing*, v. 11, Mar. 1953, p. 23-27.

Operating principles and applications to material testing. Diagrams and photographs. (S13)

115-S. Reduction of Exposure Time in Gamma Radiography. J. J. Hirschfield and D. T. O'Conner. *Nondestructive Testing*, v. 11, Mar. 1953, p. 28-33.

Technique used to reduce exposure time. Graphs and radiographs. (S13)

116-S. Uses of Low Voltage X-Ray Tubes With Thin Beryllium Windows in Nondestructive Testing. T. H. Rogers. *Nondestructive Testing*, v. 11, Mar. 1953, p. 34-39.

Advantages over Al windows. Diagrams and graphs. 21 ref. (S13)

117-S. What Causes Car Journals to Burn Off? J. J. Laudig. *Railway Locomotives and Cars*, v. 127, Apr. 1953, p. 69-73.

Experiments showed that journal failures can be attributed to Cu penetration from the bronze shell through surface of the steel journal. Suggested solutions to the problem. Photographs. (S21, Cu, ST)

118-S. (French.) **Nondestructive Analysis of Ancient Metal Objects.** Georges Ambrosino and Pierre Pinsrus. *Revue de Métallurgie*, v. 50, Feb. 1953, p. 136-138.

Qualitative and quantitative analysis of alloys using neutrons and gamma rays. Tables. (S11)

119-S. (German.) **Rapid Testing Procedures for Separating Steels.** Ewald Baerlecken. *Stahl und Eisen*, v. 73, Jan. 1, 1953, p. 30-34.

Chemical and magnetic-inductivity tests. Diagrams. 32 ref. (S10, ST)

120-S. Instrumentation and Nonferrous Metal Fabrication. *Canadian Metals*, v. 16, Mar. 1953, p. 40, 42, 44.

How instrumentat.on is used in the casting shop and in rod, tube, and sheet mills. (S18, S16, E general, F23, EG-a)

121-S. Quantitative Analysis by X-Ray Fluorescence. Application to Alloy Systems. E. Gillam. *Metal Treatment and Drop Forging*, v. 20, Mar. 1953, p. 99-102.

Results of a systematic study for determining possibilities and limitations of the method for rapid works analysis of alloy steels. Conclusions can apply generally to all metal mixtures and solutions. Graphs. (S11)

122-S. Brittle Structural Failures With Emphasis on Welded Ships. J. O. Almen. *Product Engineering*, v. 24, Apr. 1953, p. 192-203.

Season cracking of shell cases, stress-corrosion cracking of Mg, stress-corrosion failures in steel, residual stress from cold forming, cracking of cold formed members, piston pin retainer failures, grinding cracks, welding failures, residual stress from flame cutting, prestressing with hammer blows, hammer peening of soft steel, and dissection stress analysis. Photographs and graphs. 15 ref. (S21, Q23, R1, G23, Mg, ST, CN)

123-S. The Detection of Peel on White-Heart Malleable Iron Track Links by a Non-Destructive Test. "Strength & Testing of Materials". v. 6. Part II. Testing Methods and Test results. 1952. p. 121-124.

Testing by localized electrical resistance measurements. The electrical method gives useful indication of the presence or absence of peel. (S13)

124-S. (German.) **Detection of Cr in Malleable Cast Iron.** R. Leo and Gertrud Brylka. *Chemische Technik*, v. 4, Sept. 1952, p. 402-404.

Various aspects of diphenylcarbazide process. (S11, CI)

125-S. (Book.) **Practical Spectroscopy.** Theodore A. Cutting. 220 pages. 1952. William Heinemann Ltd., London, England.

Written as an aid for analyzing ores, minerals, alloys, and inorganic chemicals. (S11)

T
APPLICATIONS OF METALS IN EQUIPMENT

91-T. The Use of Stainless Steel in the Chemical Industry. W. B. Clarke. *Australasian Engineer*, Jan. 7, 1953, p. 59-65.

Design, fabrication, and production of stainless steel process vessels. Diagrams and photographs. (T29, SS)

92-T. Magnesium in Materials Handling Equipment. W. P. Sigler. *Modern Metals*, v. 9, Mar. 1953, p. 66-68.

Mg can be designed and constructed to solve a material handling problem where light weight is a factor, regardless of load capacities. Photographs. (T5, Mg)

93-T. Aluminum Banana Box. *Modern Metals*, v. 9, Mar. 1953, p. 69.

Boxes which are lightweight, clean, and durable. Photographs. (T29, Al)

94-T. Making a Fortune in Aluminum Office Chairs. *Modern Metals*, v. 9, Mar. 1953, p. 71-72.

Assembly-line production, anodizing section, painting, and finishing. Photographs. (T10, L general, Al)

95-T. Magnesium Roller Conveyors. *Modern Metals*, v. 9, Mar. 1953, p. 84.

Conveyors which are light-weight, strong, and nonsparking. (T5, Mg)

96-T. Magnesium's Sights Set High. A. W. Winston. *Steel*, v. 132, Mar. 30, 1953, p. 82-83.

Expansion of Mg industry through military applications and continued civilian use. Photographs. (T general, Mg)

97-T. (German.) **Modern Construction With Steel, Particularly in Industrial Construction.** Fritz Leonhardt. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 95, Jan. 11, 1953, p. 39-42.

Recent developments in reinforced concrete and use of thin-walled, concrete-filled steel tubes. Diagrams. (T26, ST)

98-T. Casting Diamond Drill Bits. *Canadian Metals*, v. 16, Mar. 1953, p. 47, 51.

Types of bits, manufacturing process, and bit forming. (T6)

99-T. Plastics: Machinery Market Booms. Extruders and Auxiliary Equipment. H. R. Simonds. *Iron Age*, v. 171, Apr. 9, 1953, p. 142-145.

Fabrication of equipment using iron, Al, and bronze castings; steel plates; toolsteel; low-carbon steel; and bars of SAE 1040, 3130, 3140, 4130, 4140; and Type 416 stainless. Photographs. (T5, CI, Al, Cu, TS, CN, AY, SS)

100-T. Wave-Guide Measurements in the Microwave Region on Metal Powders Suspended in Paraffin Wax. Joseph M. Kelly, Joseph O. Stenoien, and Dwight E. Isbell. *Journal of Applied Physics*, v. 24, Mar. 1953, p. 258-262.

A low-loss, high-refractive-index, artificial dielectric can be constructed by using powdered conductors if the particles are very small and possess a high electric polarizability. Graphs and tables. 10 ref. (T1, H general, Cu, Al, Zn)

101-T. Problems in Central-Station Nuclear Power. (Condensed from "Basic Problems in Central-Station Nuclear Power", by W. H. Zinn, *Nucleonics*, v. 10, Sept. 1952, p. 8-14.) *Metal Progress*, v. 63, Mar. 1953, p. 142-144.

Basic problems associated with building plants for central-station nuclear power to compete commercially with conventional sources of electrical energy, water power, and coal. (T25)

102-T. Aluminum Tanks and Pressure Vessels. E. V. Sharpnack, Sr. *Product Engineering*, v. 24, Apr. 1953, p. 183-185.

Shows why Al is replacing steel in food, chemical, aircraft, and transportation industries. Diagrams and tables. (T26, Al)

103-T. New Metals for the Atomic Age. *Steel Horizons*, v. 15, no. 1, 1953, p. 1-5, 26.

New combinations, and newly refined metals including U, Zr, and Ti. (T25, U, Zr, Ti)

104-T. Big Business From Grapes. *Steel Horizons*, v. 15, no. 1, 1953, p. 6-7.

Use of stainless steel in Welch's plants. (T29, SS)

105-T. A Stainless Spiral to Prosperity. *Steel Horizons*, v. 15, no. 1, 1953, p. 8-9.

Use of stainless steel for equipment in chemical and petroleum industries. Photographs. (T29, SS)

106-T. Kellogg Cooks With Stainless, Too. *Steel Horizons*, v. 15, no. 1, 1953, p. 18-19.

Use of stainless steel in the cereal industry. (T29, SS)

V

MATERIALS
General Coverage of Specific Materials

41-V. Engineering Data on Wrought 35 Ni-15 Cr Alloy. Paul Goetcheus. *Industrial Heating*, v. 20, Mar. 1953, p. 454-456, 458, 460, 462, 464.

Chemical composition, physical properties, mechanical properties, heat treatment, welding, cutting, machining, forming, forging, and uses. Tables and photographs. (SS)

42-V. Russians Show Progress on Stainless and Heat-Resisting Steels. Carl A. Zapffe. *Iron Age*, v. 171, Mar. 19, 1953, p. 138-142.

Use of W, Si, and Ni in Russian stainless steel technology. Compositions of various steels. Tables. 11 ref. (SS)

43-V. Gallium. L. Sanderson. *Canadian Mining Journal*, v. 74, Mar. 1953, p. 81-82.

History, distribution, properties, recovery, and industrial uses. (Ga)

44-V. Malleable Iron Castings. H. R. Clauser. *Materials & Methods*, v. 37, Mar. 1953, p. 109-124.

Properties, characteristics, and uses of the various types of malleable castings. Tables and photographs. (CI)

45-V. Tin and Tin Alloys. *Materials & Methods*, v. 37, Mar. 1953, p. 127.

Tabulated information includes composition; physical and mechanical properties; corrosion resistance; and various uses. (Q general, P general, R general, Sn)

46-V. Tin-Base Bearing Metals. *Materials & Methods*, v. 37, Mar. 1953, p. 129.

Tabulated information includes composition; physical and mechanical properties; corrosion resistance; and uses. (Q general, P general, R general, SG-c, Sn)

47-V. (Dutch.) **Copper and Copper Alloys. Pt. 10. Beryllium-Copper.** W. G. R. DeJager. *Metalen*, v. 7, Dec. 15, 1952, p. 427-431; v. 8, Jan. 15, 1953, p. 9-11.

Tabulates, diagrams, and discusses the standard compositions of commercially available alloys as well as their mechanical, physical, electric, and thermal properties. (P general, Q general, Cu)

48-V. (German.) **The Wrought Zinc Alloy ZnAl$_4$Fe.** J. Schramm. *Metall*, v. 7, Feb. 1953, p. 93-102.

Ingot preparation, working process, properties, influence of chemical composition, and applications. Tables, photographs, diagrams, and charts. (Zn)

49-V. (German.) **Standardization and Present-Day Lead Research.** W. Hofmann. *Metall*, v. 7, Feb. 1953, p. 109-110. (S22, Pb)

50-V. (Book.) **Stainless Steel Handbook.** 120 pages. 1951. Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa.

Discusses selection of the proper type of stainless, tabulates properties of the more important analyses, and lists resistances of major types to many corrosive media. Each grade is presented by itself, with its analysis, applications, and treatments. Includes stabilized types and those designed for high and low-temperature applications. (SS)

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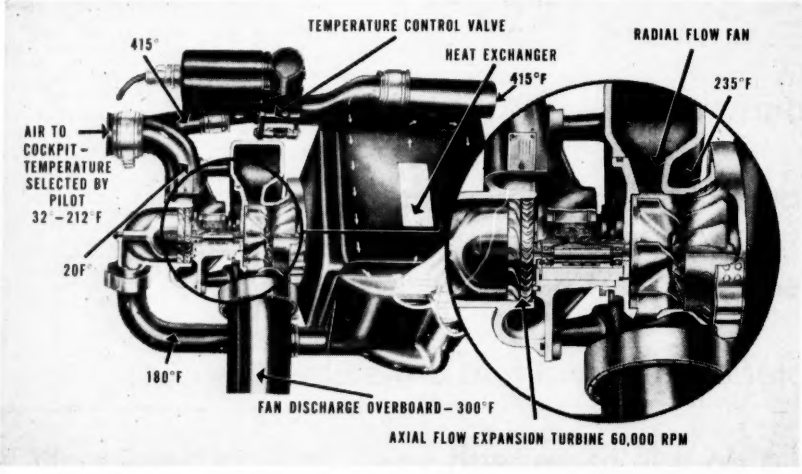

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BORON STEEL

Second Revised Edition, 1953 — Ernest E. Thum, *Editor*

Table of Contents

It's Later Than You Think, Editorial, *Metal Progress*
Saving Precious Alloys by Intelligent Use of Alternatives
Round Table Discussion, Western Metal Congress
Necessity for Further Conservation of Alloys in Steels,
by John Mitchell
Boron Steels, by Panel on Conservation,
Metallurgical Advisory Board, *D. L. McBride*, secretary
Special Carburizing Steels, Boron Treated, *by Porter R. Wray*

Record of Experience With Boron Steels

Recent Experiences with Boron Steels in Production,
by Harry B. Knowlton
Use of Boron Steel in Production of Hand Tools,
by Fred J. Robbins and J. J. Lawless
Caterpillar Tractor Co.'s Experience with Boron Steels,
by John Parina, Jr.
Forgeability, Machinability and Hardenability of Boron
Carburizing Steels, *by S. L. Widrig and Wilson T. Groves*
Distortion and Service Tests of Carburized Gears
Made of Boron Steels, *by S. L. Widrig and Wilson T. Groves*
Processing of Boron Steels in the Shop, *by G. D. Rahrer*
Boron Steel in Through Hardened Parts for Truck Axles,
by T. A. Frischman

Effect of Boron on Steel

Summary of Laboratory Investigations, *by The Editor*
Medium-Carbon Boron-Treated Steels,
by R. N. Imhoff and J. W. Poynter

Supplement on Hardenability Test, H-Steels, and Their Use

Standard Hardenability Test, *Data Sheet*
Appraisal of Steels by Their Hardenability, *by Walter E. Jominy*
Hardenability Control for Alloy Steel Parts, *by A. L. Boegehold*
Selection of Steel for Automobile Parts, *by A. L. Boegehold*

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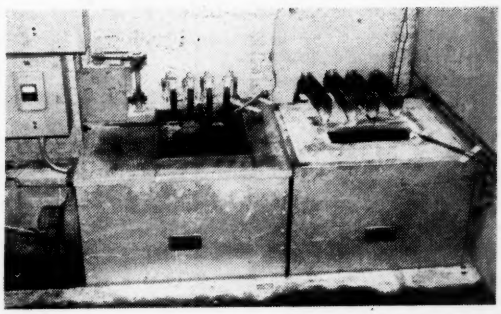

Type 401-4 Marquenching-Austempering Unit

Type 701-4 Submerged Electrode Furnace with removable electrodes

AUSTEMPERING HARDNESS VALUES VERSUS CHEMISTRY AND SIZE

Type of Steel	C	Mn	Cr	Ni	Mo	Rc-max.	Max dia. round or equiv. sq.-in.
Carbon	0.95-1.05	0.30-0.50	—	—	—	57-60	0.148
Carbon-Mn	0.95-1.05	0.60-0.90	—	—	—	57-60	0.187
Carbon	0.80-0.90	0.30-0.50	—	—	—	55-58	0.156
Carbon-Mn	0.80-0.90	0.60-0.90	—	—	—	55-58	0.218
Carbon	0.60-0.70	0.60-0.90	—	—	—	53-56	0.187
Carbon-Mn	0.60-0.90	0.90-1.20	—	—	—	53-56	0.281
Carbon-Mn	0.60-0.70	1.60-2.00	—	—	—	53-56	0.625
Alloy	0.65-0.75	0.75-0.95	—	—	0.25	53-56	0.625
Alloy	1.00	0.40-0.60	0.40-0.60	—	—	57.60	0.312
Alloy (SAE4150)	0.45-0.55	0.60-0.90	0.80-1.10	—	0.15-0.25	52	0.500
Alloy (SAE4365)	0.60-0.70	0.50-0.80	0.50-0.80	1.50-2.00	0.30-0.40	54	1.0 or lgr.

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